FINAL EVALUATION

OF THE

CENTRAL AMERICAN RURAL ELECTRIFICATION

SUPPORT PROJECT (CARES)

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EXECUTIVE SUMMARY

The Central American Rural Electrification Support program (CARES) was a seven-year, $11 5 million effort to increase the access of rural populations in the region to the benefits of electrical service Unlike many past rural electrification efforts, the program was highly integrated in that it worked with central governments, utilities, regulatory agencies, rural development organizations, and consumers in order to improve the way electricity is managed, supplied, and utilized But CARES was not a traditional program of rural electrification, in that it did not focus directly on building infrastructure In fact, very few rural people have received electrical service as a *direct* result of CARES interventions The currency of the program was the ideas and concepts it promoted, the training it provided, and the improvements it brought about in the structure of the electrical energy subsector of the region

The CARES program demonstrated that if electricity is to be a successful tool for rural economic development, central governments and central utilities must make rational decisions about those communities which are to receive service Communities which are most likely to benefit from the provision of electrical service are those which already show a fair degree of economic activity, and have businesses and activities which can make effective use of electrical power The Demand Assessment Model (DAM), introduced to the region by CARES, provides a useful tool for identifying such communities, and it is now being used extensively by central utilities in Guatemala and El Salvador The measurable differences in electrical consumption between communities electrified under the PER II and PER III programs - the latter of which employed DAM in its selection process - show the usefulness of the model

In order to avoid underutilization, residents of newly-electrified communities must be made aware of the technologies which exist to take advantage of the energy source Through seminars publications, and direct assistance, CARES promoted the idea among non-governmental

development organizations that the productive use of electricity is a key element in rural economic development As a result of CARES efforts in this area, the concept of promoting productive uses, and providing credit for equipment purchases and small business expansion has been widely disseminated in Central America In areas where they have intervened, these credit organizations have improved economic conditions Providing credit to microenterprises can raise firm and employee incomes, and create employment But credit is still in short supply in rural areas of the region, and if such programs are to continue to be successful, they will require new models of operation, as well as additional funding from bilateral and multilateral sources

CARES also showed that there are less-costly ways for central utilities to provide rural electrification Construction standards adapted to local conditions can achieve significant cost savings, allowing utilities to provide service to additional rural customers using the same limited funds Use of these methods in future rural electrification programs can increase the number of people and communities who receive service

CARES demonstrated a variety of feasible decentralized alternatives to the traditional approach of grid extension by the central utility to provide electrical service to rural areas The two most successful of these were the creation of a private utility in Roatan, Honduras, and the strengthening of municipal utilities in Guatemala. But an important lesson from the program is that the success of a decentralized utility depends strongly on local conditions - the general structure of the economy, the nature of the local government, and the availability of capital and technical and managerial expertise There is no generic model which can be adapted to every situation

Although intended to be a regional program, CARES greatest impacts were at the level of individual countries, and of individual communities or institutions within those countries There are many reasons for this First of all, despite a common history and language, conditions across Central America vary widely in terms of political structure, social and economic development, and the

receptivity of central utilities and governments to changes in operating methods These differences make it difficult to apply a truly regional approach to rural electrification

Also, because CARES was a support program and not an electrification program per se, the degree to which many of its interventions could be institutionalized in the region depended ultimately on the existence of other vehicles and other programs through which the interventions could be introduced For this reason, concepts such as the use of DAM, improved construction standards, and the promotion of productive uses of electricity had the largest impact in Guatemala and El Salvador, which was carrying out traditional rural electrification programs Efforts to build a 15 MW hydroelectric plant in Costa Rica provided another such vehicle, bringing CARES staff into contact with officials of the central utility and the regulatory agency This led to a program of institutional strengthening of the regulatory agency SNE which has greatly improved the climate for the private production of power in the nation Although successful interventions were carried out in other countries of the region - the creation of the Roatan Electric Company in Honduras, for example - their relatively isolated nature caused them to have less impact on the national or regional scale

Political realities also affected the performance of CARES, and the degree to which its concepts could be institutionalized in the region Nicaragua, for example, was not included in the original CARES study, and was only added to the program in 1990 Armed conflicts in Panama and El Salvador prevented the staff from working in these countries at various points during the course of the project Aid to Guatemala was also suspended at one point These interruptions caused delays - especially in Nicaragua - and were partly responsible for the unequal coverage of the region

In summary, the activities of the CARES project had positive impacts on the entire spectrum of participants in the electrical subsector, from central governments down to individual rural consumers For the most part these interventions were successful in individual countries and communities, rather than on the regional level The successes and failures of CARES provide AID

and other development agencies with a number of lessons learned which should be considered in the design of future rural electrification programs The most important of these are

a) **Support projects can only be effective where there are ongoing efforts to support** One reason for CARES' unequal coverage of the region is that not all national governments and central utilities in the region put the same emphasis on rural electrification

b) **Varying social, political and economic conditions in individual countries limit the potential for regional impacts** CARES' successes in individual countries and communities were difficult to extend across the region due to the unique conditions encountered in each location

c) **Project goals should be set realistically, taking into account the environment in which the project is operating, and the experience of similar projects in the past** Although the project carried out a wide range of activities which were highly valued in the region, many of the original goals were unrealistically high, and went unmet For example, given the population growth in the region at the beginning of the project, and the large investment in infrastructure required for rural electrification, it should have been obvious that the project would ultimately have little effect on the percent of rural residents with access to electricity

d) **The process of rural electrification in the developing world bears little resemblance to the history of rural electrification in the United States** In a number of cases, CARES underestimated the level of effort required for institution building and institutional strengthening This seemed to be due in part to a tendency to rely on experience gained in carrying out similar activities in the U S , under conditions which were radically different from those encountered in Central America

Other lessons related to specific project components are presented at the end of each section in the body of the evaluation report

1 INTRODUCTION

1 1 PURPOSE OF EVALUATION

The purpose of the final evaluation is to examine in detail the major activities of the CARES project to determine their impact on rural electrification in Central America, and on larger issues of economic and social development in the region Although energy as a development issue is receiving less emphasis than it once did within AID, energy supply and access to electricity continue to be of great concern to the people of Latin America and the rest of the developing world The role of electricity in rural development has been a controversial issue among development specialists The CARES project was designed and implemented with full knowledge of past successes and failures in rural electrification, and its efforts to take advantage of these lessons in turn provide other valuable lessons for future programs of this nature These lessons learned are also highlighted in the evaluation

1 2 SCOPE OF EVALUATION

The final evaluation examines the five major component activities of the CARES project Productive Uses of Electricity, Institutional and Policy Reform, Municipal Assistance, the Demand Assessment Model (DAM) and Decentralization Support Each section examines the major activity in each program area in detail, providing background information, the institutional setting, a description of the principal activities, the results and impacts of these activities, and lessons learned Since the true impacts of the project interventions will probably not realized until several years after project completion, the emphasis in the evaluation was on determining the sustainability of the major results achieved to date, and on lessons learned for future development efforts of this nature This

was carried out through site visits, interviews with key personnel in the impacted institutions, collection of data from sources internal and external to the project, and review of project documentation and reports

1 3 COMPOSITION OF EVALUATION TEAM

Beginning in 1990, the Oak Ridge National Laboratory began providing project monitoring and management support to the AID/ROCAP program manager for the CARES project These activities included assessment of annual budgets and workplans, revision of project goals and strategies, formal mid-term project evaluation, and periodic on-site monitoring and evaluation of project component activities Numerous individuals from ORNL have been involved in the work during this period, including

- Thomas Wilbanks
- Marilyn Brown
- John Shonder
- Norberto Domingo
- Robert Perlack
- Mike Jones
- Albert Garcia
- Dan Waddle
- Bob Barron

Because of its close involvement in many aspects of the project, ORNL originally proposed a plan in which it would have led a team of independent outside evaluators in carrying out the final evaluation Ultimately it was not possible to carry out this plan due to funding constraints, and with the concurrence of the ROCAP project manager, ORNL agreed to complete the final evaluation using its own personnel

2. OVERVIEW OF THE CARES PROJECT

2 1 ORIGIN AND MOTIVATION

Although integrated rural development has been a primary concern of AID for decades, the original motivation for a project to assist rural electrification in Central America can be traced to the perceived Central American crisis of the early 1980's In response to widespread civil war and unrest across the region, the U S National Bipartisan Commission on Central America was formed, which outlined a long-term U S policy to support social, economic, and democratic development in the region The report of this commission (usually referred to as the Kissinger Report) emphasized the generally poor living conditions in rural areas resulting from high unemployment, low productivity, and the disproportionately small percentage of wealth owned by the rural population It recommended that strategies be developed to address these issues The recommendations of the report were adopted by the U S Congress under legislation known as the Jackson Plan, and the 1986-1987 foreign assistance authorization bill proposed a comprehensive program of rural electrification in Central America as part of a rural development strategy for the region

In April of 1985, USAID contracted with the National Rural Electric Cooperative Association (NRECA) to conduct a rural electrification study in the countries of Costa Rica, El Salvador, Guatemala, Honduras, and Panama. The study became known as the Central America Rural Electrification Study, and its objectives were to determine the status of rural electrification in the region, to examine the issues which resulted in low coverage, and to suggest strategies to resolve the problem The purpose was to form the foundation for a more comprehensive rural electrification program

The study identified numerous technical institutional and economic constraints to rural electrification These included

- **Inappropriate technical approaches** Utilities typically did not distinguish between rural and urban electrification, resulting in systems which were overdesigned for the lower electrical demands of rural systems, and thus overly costly The solution required training in least-cost design and construction methods and revision of standards

- **Underutilization of electricity** The low demand for electricity in rural areas made electrification even less attractive for utilities, since the return on investment was low The solution was to increase the use of electricity through promotion of productive uses, and the provision of credit for the purchase of productive uses equipment

- **Poor financial situation of utilities** At the time of the study, nearly all of the Central American utilities were facing financial difficulties With its high cost and low returns, rural electrification was given a low priority by central utilities, except when subsidized by the central government This problem could be solved by making rural electrification more financially attractive to the utilities

- **Institutional issues** The dominance of large government-owned central utilities in the region created inefficiencies which further discouraged the spread of rural electrification Numerous inefficiencies in management and operations resulted in duplication of effort and loss of revenue Solutions included improving operational efficiency through training and promotion of new standards and operating techniques, and decentralization of operations

Based on the recommendations of the report, USAID entered into a contract with NRECA in May of 1987 to carry out a comprehensive program, which became known as the Central American Rural

Electrification Support project (CARES) Since at the time USAID was planning or already carrying out formal infrastructure-based rural electrification projects in El Salvador, Guatemala, and Honduras, CARES objective was to provide support to these and future efforts, in order to increase the efficiency of rural electrification investments Central America (excluding Nicaragua) in terms of population coverage, economic development, and financial return to the utilities The project included four main components, which followed directly from the recommendations of the 1985 study

- Least-cost rural electric design
- Promotion of productive uses of electricity
- Dialogue on policy and institutional reform
- Enhancement of operational efficiency

2 2 ECONOMIC, POLITICAL, AND SOCIAL CONTEXT

The CARES project began in a Central America plagued by debt, inflation, political instability, and low levels of economic growth and development The economic problems had come to affect the national electric utilities as much as any other industry As entities of the national governments, they shared in the large debts which had been incurred during the energy crisis of the 1970's Rural electrification, with its high costs and low return on investment, was given low priority, and by 1987 only about 16% of rural residents in the region had access to electricity

If by that year the political crisis which prompted the formation of the Kissinger committee was waning, the social conditions which had given rise to the crisis remained Endemic poverty, a concern for the whole of Central America, was particularly acute in the rural areas of the region The lack of access to electricity exacerbated this poverty by preventing substantive economic growth

2 3 IMPLEMENTATION HISTORY

On May 5, 1987 the U S Agency for International Development entered into a five-year, $5 0 million dollar cooperative agreement with the National Rural Electric Cooperative Association (NRECA) as a result of a congressional earmark USAID Project 596-0146 implemented this agreement as the Central American Rural Electrification Support Project (CARES) Management of CARES was assigned to ROCAP, and the project was under the direction of the Regional Energy Officer, Mario Funes

CARES opened an office in Guatemala City under the direction of Jim Lay of NRECA, and the period from 1987-1988 was dominated by organizational development (i e recruiting staff, acquiring space and equipment, and training), and by activities focused on the PER III rural electrification program in Guatemala, and a similar program in El Salvador These activities included training for personnel of INDE (Guatemalan national utility) and CEL (the Salvadoran national utility) in the use of the Demand Assessment Model (DAM), the design of least-cost rural electric standards, promotion of these standards within the national utilities, and training for technical personnel The project also began the productive uses of electricity program, training PU promoters within CEL, and beginning a fruitful association with FUNDAP, who was carrying out the productive uses component for INDE under PER-III By late 1988 and early 1989, meetings were being held with national utilities throughout the region, and discussions were underway with the rural electric cooperatives of Costa Rica on the formation of CONELECTRICAS

The Oak Ridge National Laboratory's involvement in CARES began soon after the project s inception through a PASA agreement with the USAID Office of Energy ORNL was responsible for the development of the Demand Assessment Model, and also provided project monitoring and management assistance to the original ROCAP project manager, Roberto Figueroa In 1989, ORNL performed the project mid-term evaluation

In 1990, as the result of a further congressional earmark of $5 0 million dollars, CARES' level of effort was expanded, and the project completion date was extended to March 1994 Activities initiated during 1991 included the municipal assistance program in Guatemala, and assistance in the creation of the Roatan Electric Company (RECO) Assistance to CONELECTRICAS and institutional strengthening of the regulatory agency SNE in Costa Rica received increased emphasis with the assignment of Paul Clark to the Costa Rican office With the hiring of a new project manager, Pete Smith, CARES also increased its emphasis on renewable energy for rural electrification, participating in the installation of a number of small photovoltaic systems for isolated rural communities The municipal assistance program, the creation of RECO, and the CONELECTRICAS assistance became major program activities, which occupied the majority of staff time for the remainder of the project

ORNL's involvement in project monitoring and management assistance expanded during this period Following the mid-term evaluation, the new ROCAP project manager, Mario Funes, requested that ORNL assist in the revision of CARES' logical framework ORNL was also called upon to perform interim evaluations of specific project components, such as the Guatemalan municipal assistance program, the creation of the Roatan electric company, and the San Lorenzo project in Costa Rica ORNL also regularly reviewed CARES' annual work plans, budget proposals, and annual and semi-annual reports

In September of 1994, a further $1 5 million amendment extended the period of performance of the project until March 1995 The final year of the project was spent consolidating the successes achieved in the municipal assistance program and in Roatan, and in expanding the renewables program, which has continued under separate funding since the termination of CARES With the expiration of the PASA with the Office of Energy in January 1994, ORNL entered into a PASA a direct PASA agreement with USAID/Guatemala, to continue monitoring and evaluation assistance and to perform the final evaluation of the project

3 PRODUCTIVE USES OF ELECTRICITY

3 1 SUMMARY OF MAJOR IMPACTS

Of all the activities carried out by the CARES project, the promotion of productive uses of electricity was the one which seemed to have the greatest regional impact Through its annual seminars and periodic training sessions for utilities and development agencies across the region, CARES made the value of productive uses promotion widely known across the region The most important impacts include

- Demonstrating that new rural connections which received productive uses promotion consumed twice the electricity of new rural connections without productive uses

- Demonstrating that electrical consumption for rural connections with productive uses also grew at nearly twice the rate of connections without productive uses

3 2 BACKGROUND

A well-known problem of rural development is that high construction and maintenance costs combined with low demand make rural electrification financially unattractive for national utilities At the same time, generally low family income among rural residents limits the number of households which can afford electrical connections, appliances, and the monthly consumption charge Low incomes also limit the use of electricity to domestic purposes only (lights, radios, and electric irons, for example) resulting in very low levels of consumption, and low levels of return on the utility's investment For these reasons, national utilities often require subsidies to provide

electrical service to rural areas Reducing or eliminating the requirement for these subsidies – either by lowering the utility's cost or increasing its rate of return, or both – can speed the process of rural electrification

One method of raising both connection rate and demand is to stimulate the use of electricity for productive uses Since the productive use of electricity can raise both consumer incomes and utility revenues, it tends to narrow the gap between the utility's cost and the consumers' ability to pay Produc ive uses programs can also broaden the distribution of resources, through the creation of employment opportunities Nevertheless, productive uses rarely develop spontaneously, especially in the poor and underdeveloped areas that are the focus of rural electrification Successful productive uses programs usually involve close coordination between national utilities and rural development programs They also require credit assistance, consumer education, and activities to demonstrate the advantages and uses of electricity

One of the major objectives of the CARES program was to increase the productive use of electricity in the rural areas of Central America by providing training and technical assistance to national programs of productive use promotion To this end, the project carried out a wide range of activities CARES organized a series of regional seminars and workshops which brought together rural development NGO's, national utilities, credit providers, and bilateral and multilateral lenders for training and information exchange on all aspects of productive uses promotion Bilateral AID-sponsored rural electrification projects in Nicaragua, El Salvador, and Guatemala received direct technical assistance from the project In Guatemala, CARES supported the design and implementation of the productive uses program of the PER III rural electrification project The PER III productive uses program was carried out by FUNDAP, a Quetzaltanango-based private development organization which provided community-wide productive uses promotions, loans, and technical assistance to firms and individuals in newly electrified villages in the Guatemalan highlands Since assistance to FUNDAP was the most significant activity carried out in the

productive uses component, this evaluation focuses primarily on those activities, and indicators of FUNDAP's success

3 3 FUNDAP AND PER III

Building on experience from two previous programs, the goal of the Programa de Electrificacion Rural III (PER III, Rural Electrification Program number three) was to increase the coverage of electrical service in the western Guatemalan departments of Chimaltenango, Huehuetenango, Quetzaltenango, El Quiche, San Marcos, Solola, and Totonicapan There were four main innovations in PER III which sought to avoid some of the problems which had hampered earlier rural electrification efforts in Guatemala First of all, PER III used the OPER and DAM computer programs to select the locations which would receive service A benefit/cost ratio was developed which ranked areas and communities based on the cost to INDE of providing the service and the predicted revenue from consumers Objectifying the selection process in this manner reduced political interference, since communities knew exactly how decisions were made and what was required on their part to receive service

Another innovation, begun in PER II and carried over to PER III, was to require communities to pay a share of the cost of electrification While there is some variation, the practice has been for the community to pay 35%, with USAID contributing 35%, and funds from INDE and the central government providing the other 30% The initial goal was to increase the coverage of electrification using available funding, but the requirement for community contribution had unforeseen benefits The process of raising the contribution involves the residents in the electrification process, and makes them aware of the costs and benefits of electrical service The evidence is anecdotal, but making this contribution seems to give communities a sense of ownership in the new energy source and increases their use of it

PER III was also carried out using construction standards more suited to local rural conditions Previously INDE had used the same basic techniques for erecting transmission and distribution lines in both rural and urban applications Given the differences in terrain and population density, use of urban standards in rural settings often resulted in projects which were well-designed, but more costly than necessary CARES role in the design of these new standards was significant, and according to INDE these standards resulted in a 20-30% savings in the cost of the PER III program

The final innovation in PER III was the incorporation of a productive uses component, which was performed by the Fundacion de Desarrollo del Altiplano (FUNDAP, Highlands Development Foundation) FUNDAP's role was twofold It carried out community training events designed to introduce residents to the benefits of electricity, and to display the operation of electrical machinery which can be used in their homes and businesses Since June of 1990 FUNDAP has presented 78 of these events in communities in the western highlands, with a total attendance of over 9,000

FUNDAP's other role in the productive uses component has been to provide credit to highland residents for business expansion and the purchase of electrical machinery The data in Table 3 2 1 below give some indication of the impact FUNDAP has had Since 1990, the organiza on has provided loans of more that $1,800,000 US, benefiting some 2,800 individuals For the majority of these beneficiaries, FUNDAP is the only source of credit available, since banks are reluctant to make small loans, and generally require collateral for security

FUNDAP's approach to loan security involves personal contact with the beneficiaries In its five years of operation FUNDAP has become familiar with the type of machinery used by highlands residents, and can provide technical assistance and information about vendors and prices In many cases a FUNDAP representative accompanies the beneficiary to the vendor's place of business, and the receipt for the equipment is made out in the name of FUNDAP Once the machinery is

purchased, bi-monthly visits are made to the beneficiary's residence or place of business to collect the payment and ensure that the equipment is operating properly FUNDAP can also provide managerial training, and advice on business expansion These services are paid for by the additional 4-6 percentage points in interest which FUNDAP charges on its loans compared to conventional lenders This has kept the default rate to below 4%

Table 1 2 1 Statistics for FUNDAP Loan Programs, November 1994

Indicator	Individual	Group	Total
No loans authorized	2293	96	2389
No beneficiaries	2293	387	2680
ratio male/female	75/25	76/24	75/25
Amount disbursed (Q)	10,264,772	607,550	10,872,322
Amount repaid (Q)	7,588,087	566,728	8,154,815
Active portfolio	2,665,285	40,822	2,706,107
Interest rate	30%	36%	
Default rate	4%	0%	4%
No users trained	1834	310	2,144

In 1992, a field study was carried out by a CARES consultant to determine whether FUNDAP's programs of productive uses promotion and credit provision were having the desired effect of raising incomes and electrical consumption among its beneficiaries The focus of this study was individual firms data on firm income, electrical use, size, and employment were collected from 109 FUNDAP loan beneficiaries and 70 non-beneficiaries in 12 electrified communities where FUNDAP was operating Sections 1 3-1 5 below describe that study

3 4 STUDY METHODOLOGY

The sample for the study involved the selection of 11 communities which approximated the distribution of the total number of loans by category disbursed up to that time The target group was composed of residents of rural communities with electricity who dedicated at least part of their time to occupations or businesses able to benefit from electrical machinery, and who were recipients of loans from FUNDAP to buy either electrical machinery, raw materials for processing with electrical machi ery, or both The target group consisted of 109 firms (121 total individuals) located in 11 of the 42 communities in which FUNDAP was operating The control group was composed of residents of the same eleven rural communities with electricity, who dedicated at least part of their time to occupations or businesses able to benefit from electrical machinery, and who were not recipients of loans from FUNDAP Table 3 3 1 lists the number of interviewees in the target and control group for each loan category, and the total number of loans in each category which had been disbursed by FUNDAP up to that time

The eleven communities in which the study was carried out were as follows Los Encuentros, Argueta, Barreneche, Concordia, Novillero, Chuchexic, Chuiatzam, Nimasac, Pachaj/San Francisco, Pachaj/Cantel, and Xecam All are located in the Western highlands of Guatemala, in the departments of Solola, Totonicapan, and Quetzaltenango

Sample selection was based on a review of FUNDAP files on the various communities served, in order to develop a sample which would be representative of the entire portfolio Members of the control group beneficiaries were selected in the field in the same communities by asking about individuals involved in the activities in the above sectors The control group was thus a convenience sample gathered from the communities covered by the FUNDAP program

Table 1 3 1 Beneficiaries and Non-Beneficiary Firms Interviewed			
Sector	Total FUNDAP Beneficiaries	Beneficiary Firms Interviewed (Target)	Non-Beneficiary Firms Interviewed (Control)
Tailors	420	24	26
Embroiderers/dressmakers	205	48	22
Carpenters	121	18	9
Shoemakers	12	2	11
Music-related/church	75	6	
General stores	18	8	
Corn mills	10	3	2
Metal/mechanical	4		
Tin workers	4		
Cement block manufacturers	3		
Total	872	109	70

3 5 BENEFICIARY STATISTICS

FUNDAP's productive uses program involved carrying out promotional visits to communities in which, based on previous community visits, productive activities existed which could be adapted to electricity Not all of those who eventually received credit from FUNDAP knew about this promotional activity only 76 of the 121 beneficiaries (62 8%) were aware that a promotional activity had taken place, and only 63 beneficiaries (52 1%) personally attended the promotional activity

The majority of loans went for fixed capital and were non-recurrent A total of 97 of the sample beneficiaries (80 2%) received just one loan to purchase a machine, while another 11 beneficiaries (9 1%) received a loan for working capital for the purchase of materials Four others (3 3%) received one loan for fixed assets plus another loan for working capital Three beneficiaries (2 5%) received two fixed asset loans, while another three (2 5%) received two working capital loans, and finally, two beneficiaries (1 7%) received two fixed asset loans plus one for working capital for a total of three loans Thus, a total of 106 sample beneficiaries (87 6%) received at least one loan for fixed assets while a total of 20 beneficiaries (16 5%) received at least one loan for working capital

The program distributed the loans swiftly and reached the intended beneficiaries Ninety-six beneficiaries (79 3%) stated that the loan funds were disbursed rapidly, FUNDAP claims that loan funds are disbursed within 10 working days after paperwork is completed Just 14 9% of loan recipients had received a loan previously from some other institution, clear evidence that the loans are generally destined to individuals with no other source of credit Of the 18 beneficiaries who had previously received credit and for whom data were available, half had received it from a commercial establishment, while five (27 8%) received credit from development loan programs similar to FUNDAP

3 6 STUDY RESULTS

Monthly electricity consumption data was collected from INDE for 129 meters in the study group for the 1989-1992 period Nearly every firm for which data were available had had electricity previous to the beginning of 1989, there were just a few cases where the firm received electricity after 1989 The total average electricity consumption for all firms (both FUNDAP and control) for the 48 months of 1989-1992 was 53 8 kWh per month, compared with an average electricity consumption for all residential users (which probably includes some productive users) in the sample

area of 22 0 kWh per month and for combined residential, commercial, and industrial users (which obviously includes some productive users) in the sample area of 26 4 kWh The study did not find any significant difference in electrical consumption between the FUNDAP and control firms

Consumption in the firms increased over the four years from an average of 46 4 kWh per month in 1989 to 66 4 kWh per month in 1992, an average increase of 20 0 kWh In contrast, the average of all residential users rose from 19 2 kWh per month in 1989 to just 26 1 kWh per month in 1992, and combined residential, commercial, and industrial users rose from 22 5 kWh in 1989 to 32 3 kWh per month in 1992, average increases of 6 9 kWh per month for residential users and 9 7 kWh per month for the combined residential, commercial, and industrial users

The data indicate that productive uses do indeed represent a pattern of kWh consumption that is roughly twice that of non-productive uses, and that they tend to increase their kWh consumption over time at roughly twice the rate of non-productive users

In order to determine a measure of income, interviewees were asked what their production costs were for each product and what that product sold for Income per product was then calculated, and product incomes were then added to produce an approximate income for the firm Given the problems inherent in collecting these data, data processing included routines to calculate not only the mean and median but also to adjust for informant error While there were large differences among the various categories of firms, the monthly mean income of FUNDAP beneficiaries was found to be approximately twice that of non-beneficiaries

3 6 CONCLUSIONS/LESSONS LEARNED

On a regional level, CARES was successful at publicizing the importance of productive uses promotion and provision of credit The annual workshops were well-attended, both by utility personnel and by non-governmental development organizations from all over Central America The general awareness among these organizations of the importance of productive uses appears to be due in large part to the efforts of CARES But as with other project activities the majority of the real progress – as measured by the number of people receiving credit and promotions, and making purchases of equipment – was limited to those countries which were already carrying out large-scale rural electrification programs

While at the time the study was performed there was no significant difference in electrical consumption between FUNDAP beneficiaries and non-beneficiaries, firms with productive uses were shown to have an average electrical consumption twice that of the average connection in the area

It is clear from interviews with personnel from FUNDAP and INDE that CARES' assistance was instrumental in the success of FUNDAP In addition to material and financial assistance, CARES productive uses specialists trained FUNDAP personnel in the presentation of promotional events, and instituted a program of technical assistance which has been one of great value to the loan beneficiaries That FUNDAP is now receiving assistance from other bilateral and multilateral institutions shows that it has achieved a degree of sustainability, and will continue its operations after the CARES and PER III programs are completed

But given the key role that productive uses promotion played in the success of PER III, it is curious that so little emphasis was placed on this activity in CARES' other, smaller-scale programs of assistance Assistance to the municipal utility of San Marcos, Guatemala is one example Because few communities in the department of San Marcos received electrical service through the PER III

program (and none at all in the municipality), FUNDAP had no presence there, productive uses promotion did not occur, and no loans were made What rural electrification has occurred in the municipality came about because of the programs of the municipal utility That CARES chose to concentrate on improving the managerial and technical capabilities of the San Marcos utility is not surprising, given the situation there when the assistance program began But now that the performance has improved, it seems that the program of rural electrification being carried out by the utility could be much more beneficial – both for the rural residents of San Marcos and for the utility itself – were productive uses incorporated Nevertheless, there was little emphasis placed on productive uses in San Marcos Consumption from new rural connections is at the low level of 7-12 kWh/month seen in PER II communities

In Roatan, CARES main focus was on the financial and technical issues involved in the privatization of the utility The complex series of negotiations with the government of Honduras, the national utility ENEE, and investors on and off the island were clearly necessary activities, as was the managerial and technical assistance provided to the newly-formed private utility But the electrification of the rural areas of Roatan is taking place with little or no emphasis on productive uses, despite the fact that there is a credit/development organization on the island which could be playing a role similar to that of FUNDAP in PER III

The most surprising thing about the CARES productive uses component was its lack of emphasis on agriculture Increased agricultural production and productivity are often cited as one of the primary benefits of rural electrification, indeed this benefit was mentioned prominently in NRECA's 1986 rural electrification study, and the CARES Project Paper itself emphasizes "productive activities for rural areas of Central America, particularly those leading to increased agricultural incomes and employment opportunities " Yet virtually none of the loans provided by FUNDAP were for agricultural equipment Since the income of a small farmer can be affected by so many variables – demand for his crop, weather, insects, blights, etc – agricultural loans represent a higher risk, and

development organizations prefer not to grant them

A frequent criticism of many past rural electrification efforts has been that their benefits accrued primarily to small groups of relatively affluent rural farmers, rather than to the majority of rural poor Through its links with FUNDAP, the PER III program did distribute its benefits more equitably the rural poor were given access not only to electricity, but to credit for working capital and machinery purc ase But while no affluent farmers benefited from these loans, neither did any poor ones, since loans ere not granted at all for agricultural equipment This is a serious shortcoming, because the majority of Central Americans continue to derive their primary income from agriculture Electricity can indeed increase agricultural production and productivity, but as with any productive use, this requires promotion and access to credit

At the time the CARES project was operating, USAID was also sponsoring the Highlands Agricultural Development (HAD) project in Guatemala Recognizing the difficulty rural farmers have in raising credit individually, one of the goals of HAD was to develop small cooperatives which would allow farmers to pool both their resources and their risks The emphasis seems to have been primarily on the financing and construction of small irrigation systems Had there been closer coordination between PER III, CARES, and HAD, the benefits of electrification might have been more fully realized in the agricultural sector HAD could have worked with PER III in the same way that FUNDAP did, by promoting productive agricultural uses of electricity among less-affluent residents of newly electrified communities This advocates for closer coordination between the managers of the various projects in AID's portfolio

It is apparent from the experience of the CARES project that in general, rural electrification in developing countries does not have the same impacts on farming that it did in the United States and other developed countries The agricultural sector in Central America is characterized for the most part by a relatively small number of landowners working large, extended lands, while the majority

of inhabitants practice subsistence agriculture on plots of less than one acre Subsistence farmers do not have the resources or the access to credit which would allow them to purchase incubators, refrigeration and grain drying equipment, or the range of other technological innovations which transformed North American agriculture in the early decades of the 20th century Furthermore, few of these innovations are economical at the scale of the subsistence farmer Electrification can have both direct and indirect benefits on agriculture in developing countries, but in planning for future rural electrification, USAID should consider that the set of benefits may be quite different from those seen in the United States

4 POLICY AND INSTITUTIONAL STRENGTHENING

4 1 SUMMARY OF MAJOR IMPACTS

The most important activities carried out in the policy and institutional strengthening component were the creation of the consortium of Costa Rican rural cooperatives CONELECTRICAS, and the strengthening of the Costa Rican regulatory agency SNE Specific impacts of these activities include

- Creation of a private fund dedicated to rural electrification, in the form of contributions from the member cooperatives of CONELECTRICAS

- Changes in Costa Rican law which facilitate private investment in the power sector

- Strengthening SNE's role in the regulation of the power sector, providing training and software to allow the organization to analyze the national utility's tariff proposals

4 2 BACKGROUND

The status of rural electrification in Costa Rica - and of the country's electrical sector in general - is in many ways more advanced than that of the other countries of Central America For example, fully 87% of Costa Ricans have electrical service in their homes, as compared to 46% for the population of Central America as a whole The nation's rural population is served by four independent cooperatives and a number of smaller companies which purchase power from the national utility ICE (Instituto Costarricense de Electricidad) and distribute it to their customers with an efficiency which is exemplary in the region Costa Rica is also the only country in Central America whose electrical sector is regulated by a government agency - the Servicio Nacional de

Electricidad (SNE) - which is independent of the national utility

But despite its favorable comparison to other countries of the region, by the beginning of the CARES project the Costa Rican electrical sector faced a number of difficult financial and structural problems With demand increasing at the rate of about 6% per year, expansion of generating capacity was effectively stalled due to ICE's large foreign debt Inflation and the falling value of the colon with respect to the U S dollar were raising the cost of servicing this debt, and lenders were reluctant to extend new credit given the utility's already high debt-to-equity ratio With little capital available for expansion of generating capacity, most economists and development organizations were recommending private investment in the power sector as the most effective way to meet future demand

The government of Costa Rica was amenable to the concept, but there had been little recent experience with private investment in the country's power sector, and the required legal and institutional frameworks did not exist Prior to the 1940's Costa Rica did have a large and active private power sector, but because the plants were almost exclusively foreign-owned - and were subsequently nationalized - private generation remained a sensitive political issue With the passage of Law 7200 in 1990, the government did finally authorize the licensing of private power producers, but only with significant restrictions The size of each project was limited to 20 MW, no private producer could have foreign ownership in excess of 35%, and the aggregate generating capacity of the private sector could never exceed 15% of ICE's own capacity Because private producers were allowed to sell power to ICE only, significant growth of the private sector called for a strong, independent regulatory agency to balance the national utility's power in the market

The new law gave SNE the authority to grant concessions and regulate the prices ICE would pay to private producers But it was widely recognized that SNE lacked the technical capacity and institutional strength to carry out an effective regulatory role Since its establishment in 1928, the

agency's authority had been expanded in a patchwork fashion to include fuels, transportation, telecommunications, irrigation, and other services, but its funding had not kept pace with the increase in responsibility Given that the organization was already spending 97 5% of its operating budget on personnel costs, there were little funds available for the training, computer equipment, and software required to perform credible analyses of ICE's tariff proposals or other important regulatory tasks It was clear that for SNE to be effective in the development and regulation of the private power market, fundamental changes would be required in its operations

As the largest non-governmental entities in the power sector, Costa Rica's electrical cooperatives seemed well-suited to enter the private generation market Given their decades of experience and their large membership base, the four had the potential to become important actors in the power sector, as have an increasing number of rural cooperatives in the United States Nevertheless, by the beginning of CARES' involvement, the cooperatives were themselves servicing large debts, and were in the same unfavorable position as ICE with respect to lenders and potential investors The coops were also beginning to lose service territory to ICE, and one of the four, COOPEGUANACASTE, was experiencing serious management difficulties and was in danger of being taken over completely Without the assistance of an outside organization with experience in modern management and operating techniques, as well as project development and financing, the cooperatives stood to lose their chance to play a significant role in the private power sector

This was the situation encountered by the CARES project in Costa Rica Though not stated explicitly in the original project documents, given the activities it eventually carried out CARES' original goal seems to have been to strengthen the operations of the cooperatives The cooperatives had already shown interest in developing generating capacity, but given their financial position, it seemed unlikely that any one of them individually would be capable of attracting the investment required One of CARES primary activities in Costa Rica was to promote the formation of a consortium of the four cooperatives, called CONELECTRICAS Although the consortium was to

eventually provide other benefits for the coops, including provision of common services such as management assistance, substation design, load management, and mapping, the primary purpose was to allow the cooperatives to join forces to develop generation and transmission facilities As such, CONELECTRICAS became the vehicle for development of a proposed 15 6 MW hydroelectric project in the San Lorenzo watershed

In the course of developing the San Lorenzo project, CARES recognized the key role SNE would play not only in the approval of this project, but in the overall development of the private power sector Other actors in Costa Rica were making the same realization at the time With the Ley de la Autoridad Reguladora de los Servicios Publicos (Regulatory Law for Public Services) the legislature was proposing to make fundamental changes in SNE's operations, transforming it into a new organization with more clearly defined regulatory authority and responsibility, and with adequate sources of funding CARES came to play an important role in drafting this bill, providing funds for a study tour by a Costa Rican congressional committee of regulatory agencies in the United States, and presenting testimony before the committee

The project began a program of institutional assistance to SNE, starting with a general management audit which resulted in a plan for strengthening the operations of the organization in order to fulfill the roles assigned to it by the new laws on private generation and regulatory reforms As CARES' work with SNE continued, other organizations such as the IDB and the USAID bilateral mission in Costa Rica also recognized the importance of the regulatory agency in the development of private power, and began planning their own programs of assistance to SNE Institutional reform of SNE came to be one of the most important activities of the CARES project in Costa Rica, and one which may turn out to have the greatest impact on rural electrification and the electrical sector as a whole

The following sections analyze the two primary activities of the project in Costa Rica

strengthening of the electrical cooperatives (through the creation of CONELECTRICAS and the subsequent promotion of the San Lorenzo project, as well as other direct technical and managerial support), and the institutional strengthening of SNE The chapters take the form of case studies, detailing the activities carried out by CARES and evaluating their likely short- and long-term impacts on rural electrification in Costa Rica

4 3 CONELECTRICAS

CARES involvement in the formation of CONELECTRICAS began with a meeting in 1988 between Jim Lay, then chief of party of the CARES project, the managers of the four rural cooperatives, and the managers of the municipal utilities of the cities of Cartago and Heredia The purpose was to discuss CARES assistance to a proposed "Consortium of Electric Cooperatives and Municipal Electric Companies" The CARES' 1989 mid-year report lists the following objectives for the organization

- To supply electrical power for its members
- To reduce the cost of new construction and materials through bulk purchases
- To reduce service costs through provision of joint services
- To promote institutional reforms for decentralization and privatization in Costa Rica

Although these objectives were of interest to the municipal utilities as well, they were ultimately unable to join due to differences between their status and that of the cooperatives under Costa Rican law When the organization was chartered in 1989 as the National Consortium of Costa Rican Electric Companies (CONELECTRICAS) its membership included only the four cooperatives Coopesantos, Coopeguanacaste, Cooplesca, and Coopealfaro-Ruiz

The four cooperatives were an obvious choice to take advantage of the private power generation law, which was then pending in the Costa Rican legislature With combined revenues of $8 15 million, and a member base of 65,000, the four together would comprise one of the largest non-governmental entities in the electrical sector The history of the rural electrification in the United States had shown that the formation of regional generating and transmission "supercooperatives' brought a number of benefits to the rural coops, including increased bargaining power in negotiations with utilities and a measure of energy independence Given NRECA's role in shaping this history

it seemed logical that CARES would attempt to replicate the experience in Costa Rica

While the cooperatives were indeed interested in pooling their resources to achieve the objectives cited above, it is clear from project documents and interviews with managers of the cooperatives that CARES was the driving force behind the creation of CONELECTRICAS CARES personnel were intimately involved in writing the business plan for the organization, its bylaws, and in its ultimate incorporation It appears unlikely that CONELECTRICAS would have been formed at all without CARES assistance

4 THE SAN LORENZO PROJECT

Immediately upon its formation, CONELECTRICAS began examining its options for power generation CARES provided funds for a preliminary assessment of fourteen potential hydroelectric sites, and two were selected for further study the 15 6 MW San Lorenzo site, and another 12 MW site at La Viejo CARES then funded a more extensive analysis on each site to determine its costs, access, operating efficiency, hydrology, waterflow, and geotechnical issues According the business prospectus for the project, the San Lorenzo site was chosen for the following reasons

- It was cost effective, given its low installed cost of capital per kWh
- An existing paved road allowed easy access
- Excellent water quality of the San Lorenzo river
- There were geotechnical risks at the competing La Viejo site

Prefeasibility, feasibility, and auxiliary technical studies of the project were all very favorable The $20 million construction estimate placed the cost per kilowatt at approximately $1300, or about 65% of what ICE was paying for its new generating facilities The financial projections appeared

attractive as well - although significantly, these would ultimately depend on ICE's private power tariff, which had not yet finalized - and so CARES and CONELECTRICAS began two parallel efforts to obtain a private power agreement (PPA) with ICE for the project, and to attract the outside investment required

In theory, the process established by Law 7200 for obtaining a PPA is straightforward A private producer first identifies a site and applies for eligibility from ICE and environmental certification from MINIREM (Ministro de Recursos Naturales, Energia y Minas) Once eligibility is granted by ICE, the producer applies to SNE for water rights and a concession to generate power The producer must then demonstrate the financial and technical feasibility of the project, and negotiate the PPA with ICE In the case of San Lorenzo, the eligibility, environmental certification, and concessions were all in place by December of 1991 But the process of attracting a business partner and obtaining the PPA were to prove much more difficult

During 1991 NRECA had set up an office in San Jose Headed by Paul Clark, the office not only coordinated CARES efforts in Costa Rica, but served as a headquarters for NRECA's other Latin American operations With Clark's arrival in the Costa Rican capital, efforts to find a business partner for the San Lorenzo project began in earnest

The four cooperatives had already won rate increases from SNE to provide capital for the construction of the project, but from the beginning it was recognized that a business partner would be required not only to contribute additional equity, but also to provide business experience, and experience in operating a hydroelectric facility A business prospectus was prepared and circulated to potential investors In September of 1991 CARES arranged meetings in Washington D C between the CONELECTRICAS board and four independent power companies who had expressed strong interest in the project Meetings were also held with the International Finance Corporation (IFC) and the Interamerican Investment Corporation (IIC), both of which were interested in providing equity

and financing for the project

An example of the financial plan proposed during this time frame is shown in Table 2 1 CARES and CONELECTRICAS envisioned a conservative 70/30 debt-equity ratio for the project Approximately half the debt was to be provided by IFC and IIC, with another 43% coming from loans by the U S Import-Export Bank for the purchase of U S -manufactured equipment The remainder of the debt was to be provided by local Costa Rican banks

CONELECTRICAS was planning to contribute $1 25 million in equity from its capitalization fund, and was seeking in the neighborhood of $2 million in equity from a private business partner, with the balance coming from various other sources including IFC/IIC The most controversial aspect of the equity plan proposed at this time was NRECA's contribution The initial proposal was to use $1 million dollars of CARES' funds, in a somewhat complicated debt swap plan to leverage the private investment The use of CARES funding was never popular with USAID program managers, and the plan did not receive official approval Ultimately as CONELECTRICAS' capital funds grew, they were able to commit additional equity, and the CARES contribution was eliminated from the financial plan

In December of 1991, the CONELECTRICAS board signed a Joint Development Agreement (JDA) with Dominion Energy, Inc , a U S -based firm with experience in financing, constructing, and operating hydroelectric power facilities Although an important first step, the JDA was merely a formal statement of intent between DEI and CONELECTRICAS The two parties outlined their mutual interest in the San Lorenzo project, and their intention to form a new corporation, CONSA, which would develop, finance, build, and operate the facility subject to a number of conditions The primary condition was the signing of a Private Power Agreement with ICE, but a final decision to enter into the joint venture would also be subject to corporate, regulatory, and legal approvals on both sides Each party was given the right to terminate the agreement for any reason upon fifteen day

notice to the other

Table 2 1 Original Financial Plan for San Lorenzo Hydroelectric Project		
Debt		
Organization	Amount (US 1,000$)	Percent
IFC/IIC	7,000	50%
Suppliers Credit	6,000	43%
Other	1,000	7%
Total	14,000	100%
Equity		
CONELECTRICAS	1,250	21%
NRECA	1,250	21%
Private Investors	2,000	22%
IFC/IIC	1,500	25%
TOTAL	6,000	100%
TOTAL FUNDS	20,000	

Dominion was reportedly still concerned about the tariff which ICE had proposed for private power producers, as well as other terms of the agreement with ICE Under Law 7200, ICE was to make an annual proposal of the tariff it would pay to all private producers, subject to approval by the regulatory agency SNE The tariff is divided into capacity and energy payments Capacity payments, measured in megawatts, are payments to private producers for having the capacity to produce power and sell it to ICE Energy payments, measured in kilowatt-hours, are payments for the actual amount of energy sold to ICE during a year The tariff proposes different capacity and energy payments for peak and off-peak periods, and for the wet and dry seasons The utility makes

no payment for capacity during the wet season, since it has ample hydroelectric capacity during those months

As discussed more fully in the next section, CARES discovered that SNE, which was to approve or disapprove ICE's payment structure, did not have the capacity to perform a credible analysis of the tariffs The project began a program of assistance to SNE with the goal of strengthening its capacity to make informed regulatory decisions SNE was provided with tariff analysis software and technical training which allowed it to perform its own analyses of ICE's proposals Using slightly more pessimistic assumptions, SNE was able to show that higher tariffs were warranted, and ICE ultimately proposed a higher tariff

At the time the agreement was signed with Dominion, ICE was proposing a long-run average tariff of $0 047 per kWh, but even when it was raised to $0 057 per kWh the financial projections for return on investment for the San Lorenzo project were reportedly still below Dominion's threshold There were other problems as well Dominion was concerned about provisions for foreign exchange Since ICE would pay for the energy in Costa Rican colones, fluctuations in the exchange rate between the colon and the dollar could have a strong impact on the profitability of the pro ect Although ICE had proposed to adjust the tariff annually to account for the exchange rate, it was ot clear whether the adjustment would be sufficient to cover losses which might be incurred during a given year as a result of short-term fluctuations, or simply adjusted annually to reflect the current exchange rate

Late in 1992, Dominion invoked its right to terminate the agreement and dropped out of the project, citing the low tariff, the lack of assurances over exchange rate adjustments, and the cost of political risk insurance While many familiar with the project have speculated on Dominion's "true" reasons for withdrawing, the issues raised do have some validity The rate of return for the San Lorenzo project is still probably not at the point where it can be considered attractive to international

investors, and a number of other issues with respect to tariffs remain unclear At the date of this evaluation Paul Clark continues to be optimistic A group of Norwegian investors has expressed interest in the project, but no firm commitments have been made

But the fact remains that other private energy projects are underway in Costa Rica, including one which was rejected in the initial survey of 14 hydroelectric sites Why then has the San Lorenzo project failed to attract outside investment? Although no firm answer can be given, it is possible to cite some likely factors which may provide lessons for other efforts of this type First of all, it is clear that despite the opening provided by Law 7200, there are still significant restrictions on the private power market in Costa Rica CARES efforts with SNE and ICE have changed the environment for private generation significantly, but the restrictions still tend to favor small, low-cost, low-risk projects, and discourage foreign investment As Table 2 1 shows, the San Lorenzo project depended on foreign investment for both equity and debt

Another key factor may have been CONELECTRICAS lack of experience in negotiating complex business deals like San Lorenzo While CARES provided a great deal of assistance, ultimately it was CONELECTRICAS itself which had to close the deal CARES experience showed that the cooperatives are very cautious and slow to react to opportunities This should comes as no surprise As member-owned, non-profit organizations, rural electric cooperatives are known for their careful, minimal-risk approach to business

In this case, CARES cannot be faulted for its decision to promote the San Lorenzo project, as had it been built it would have been a regional success story In order to protect their interests, the cooperatives need to develop their own sources of energy, and Costa Rica is facing a capacity shortage But given CONELECTRICAS' lack of experience in the electrical generation business, a more cautious strategy might have been to start with a smaller project which did not require as much foreign capital Though resulting in slower growth for CONELECTRICAS in the short term, such

a project might have provided, in the long run, the business and technical experience which is required to negotiate, finance and operate a project like San Lorenzo

4.5 OTHER CONELECTRICAS ACTIVITIES

CONELECTRICAS had three other goals besides generation of electricity to reduce the cost of new construction and materials through bulk purchases, to reduce the cost of service through provision of common services, and to promote institutional reforms for decentralization and privatization in Costa Rica. While the majority of efforts were focused on the San Lorenzo project, the consortium has made some progress in other areas With CARES assistance, CONELECTRICAS made a decision to establish a transformer rehabilitation facility, and imported a transformer rewinding machine and kiln through NRECA's surplus equipment program Another example of the consortium's member services activities was the purchase of 1,000 compact fluorescent lamps, which were sold to consumers at subsidized prices as part of a pilot energy and demand conservation program CONELECTRICAS is also sponsoring the implementation of computer-based mapping software for the cooperatives All of these activities have relied heavily on CARES funding and technical assistance

CONELECTRICAS has also begun to take on an advocacy role for the cooperatives and for rural electrification in general in Costa Rica The consortium is an active member of ACOPE, and regularly presents its views to the Costa Rican legislature But despite these activities, interviews with cooperative personnel in Costa Rica indicate that San Lorenzo is still their major concern While they admit that the member support activities are worthwhile, the cooperatives feel that they have made a significant investment in CONELECTRICAS, and are waiting for a return

4 6 IMPACTS OF CONELECTRICAS ASSISTANCE

It is clear that the formation of the CONELECTRICAS consortium was directly due to interventions of the CARES program Project documents and interviews with key personnel in Costa Rica show that CONELECTRICAS relied heavily on CARES assistance in its formation and in carrying out its subsequent activities But the key question is whether CONELECTRICAS has indeed transformed the environment for rural electrification in Costa Rica Although it is too soon for these impacts to be measured directly, some general observations can be made

First of all, the creation of CONELECTRICAS was a major accomplishment in itself Through the efforts of CARES, the cooperatives became aware of their common goals and joined together to achieve them CARES heightened awareness among the Costa Rican cooperatives that rural electrification is a worthwhile cause which needs strong advocates, and access to modern technology and operating methods This is a major accomplishment, and is a credit to the program

It is also important to note that of all the organizations to receive assistance under the CARES program, CONELECTRICAS is unique in that it incorporated a method of sustaining itself financially The creation of a fund of more than a million dollars to date in private capital devoted specifically to rural electrification is unprecedented in the region If the San Lorenzo project is funded, it will earn approximately 30 million dollars for the cooperatives in 15 years, allowing the cooperatives to invest in other generation projects CONELECTRICAS appears poised to become a significant producer of electricity, which in the long run will help to offset the supply shortage in Costa Rica

But although the consortium appears sustainable in financial terms, it is clear that it will require additional assistance to ensure effective use of these funds For the foreseeable future, the consortium will have to rely on outside organizations such as NRECA to maintain its awareness of new

technologies and methods of operation Although it has carried out some member-support activities with CARES assistance, there are few indications at the present time that CONELECTRICAS will develop on its own into an organization which can provide technical and managerial assistance to its member cooperatives CONELECTRICAS will also need additional assistance to negotiate the San Lorenzo project or other facilities

The question must be asked whether the two roles envisioned for CONELECTRICAS - that of a generation and transmission supercooperative which would supply its member cooperatives with electrical power, and that of an NRECA-like organization which would provide technical, managerial, financial, and political support- are in fact compatible with one another Certainly this arrangement is contrary to the manner in which the rural electric sector has evolved in the United States, where G&T cooperatives focus primarily on the business they know best - generation and transmission of electricity - and NRECA, regional organizations, and consultants provides the support services

It may be that in a country the size of Costa Rica, the creation of two distinct organizations is not feasible Without the income from the generating facilities, it is unlikely that a member-supported organization of the scope of NRECA could be sustained solely on the contributions of the four cooperatives Nevertheless, even before it has begun to generate electricity, CONELECTRICAS is already seen to be devoting the majority of its resources to the generation and transmission side of the business, in attempting to attract support for San Lorenzo While it may be argued that the consortium needs the income from the generating facility before it can begin to provide support services to its members, it is interesting to note that the business prospectus developed for prospective investors in the San Lorenzo project stresses CONELECTRICAS' role as a provider of electricity, and makes no mention of any support activities Since the prospectus was developed for the specific purpose of attracting investment in the hydroelectric project, it is no wonder that it tends to emphasize the G&T aspect of CONELECTRICAS' mission But there is no reason to believe that

the technical and managerial support activities for its members would decrease the likelihood of attracting investment, and so the omission of any discussion of these activities from the prospectus seems to indicate their relative lack of importance both to CONELECTRICAS and its member cooperatives

NRECA is presently examining alternatives to continue support to CONELECTRICAS once the CARES project ends One concept is a joint NRECA-CONELECTRICAS foundation, which would allow the two organizations to share financial and technical resources It is clear that unless and until the San Lorenzo or another similar project is built, CONELECTRICAS will continue to require outside assistance

4 7 INSTITUTIONAL STRENGTHENING OF SNE

The Servicio Nacional de Electricidad (SNE) was founded in 1928 as a result of Law No 77, which had among other objectives the nationalization of Costa Rica's electrical generating facilities and the establishment of a national electric utility Along with the authority to regulate and promote the use of generating plants over 500 Hp in size, SNE was given the general mission to protect the interests of the consumer with respect to public services The intent was that SNE would develop into a national utility, with the government purchasing private generating facilities as their concessions expired But this objective was never achieved With the creation in 1949 of the Instituto Costarricense de Electricidad (ICE), the goal of establishing a national utility was finally achieved, though in contradiction of earlier laws which stated that SNE was to have this responsibility But SNE survived the transition and took on a strictly regulatory mission, modeled after regulatory agencies in the United States

Over the years SNE was also given the authority to regulate water resources, telecommunications,

public transport, fuels, and other services Unlike other agencies in the region which began with similar objectives, SNE was able to maintain its independence from the national utilities it regulated, and today is essentially the only independent regulatory body in the electrical sector in Latin America

With the passage of law 7200 in 1990, which for the first time allowed private power generators to enter the market, SNE was given the authority to grant concessions to private firms, and to regulate the prices which would be paid for this energy The purpose of this law was to take advantage of the private sector to make up a portion of the predicted shortfall in Costa Rica's generating capacity But ICE was reportedly opposed to the concept, and perhaps because of this, the new law gave the national utility a great deal of control over the private sector Along with restrictions on foreign ownership, the size of each project was limited to 20 MW, and the aggregate size of the private sector could never exceed 15% of ICE's own capacity Perhaps the most important provision was that privately generated power could be sold only to ICE, at prices which ICE itself proposed Thus the only real check on the national utility's control of the market was SNE

As CARES began its efforts to promote the San Lorenzo project, ICE made its first tariff proposal, at a long-run average price of $0 047 per kWh It was obvious that this price was far too low to provide a reasonable return for the San Lorenzo project, and in fact would have limited the private sector to a few small, very low-cost projects Thus CARES and CONELECTRICAS, along with the newly formed Costa Rican Association of Private Energy Producers (ACOPE) brought their case before SNE

Law 7200 specified that ICE was to base its price on its average long-run marginal costs, in other words, the utility would pay private producers the same price ICE itself would pay to provide the same capacity and energy In order to develop its tariff, ICE contracted with the French state utility, Electricite de France (EDF), which used the LOGOS computer model Believing that higher prices

were justified, the private power producers requested that SNE review ICE's proposal, its assumptions, and the manner in which the tariff was calculated But since LOGOS is proprietary, ICE was unwilling to make the software available to SNE And since SNE had previously based its tariff calculations on the traditional method of accounting allocation, it had neither the experience nor the technical capacity to carry out marginal cost analyses of the type specified in Law 7200

In keeping with its goal of transforming the institutions which control rural electrification, CARES made the decision to begin a program of institutional strengthening for SNE Of course, there was strong motivation for providing this assistance CARES was determined to see the San Lorenzo project built, and higher tariffs were necessary to make the project profitable from the perspective of foreign investors But CARES and other international aid organizations reasoned that without a strong regulatory agency to balance the power of ICE in the market, the entire purpose of Law 7200 - to provide Costa Rica with generating capacity to make up the predicted shortfall - would be defeated

CARES' first formal activity related to SNE was an audit carried out by a team of consultants from NRECA International in June-July of 1991 The audit confirmed the consensus in Costa Rica that SNE was in need of an organizational overhaul in order to be an effective regulator of public services In addition to the need for changes in the basic organizational structure, more reliable methods of financing the organization, and technical training for its staff members, the audit recommended fundamental changes in the way regulatory functions were carried out by SNE the implementation of regulatory planning cycles, a public hearing process for regulatory issues, and an increase in - or at least a clearer definition of - SNE's authority to make decisions which were legally binding on the regulated utilities

But these changes would require an official redefinition of SNE's responsibilities, and as well as modifications in the regulatory climate in Costa Rica At the time of the audit, SNE was still

operating on the basis of the 1928 law, which, although it had been modified many times, had not been completely updated since 1941 Recognizing the need for modification of SNE's charter, a committee in the Costa Rican legislature began preparation of a bill entitled "Law of the Regulatory Authority of Public Services", with the goal of transforming SNE CARES took an active role in the development and passage of this bill, funding a study tour for the congressional committee to visit regulatory agencies in the United States, and providing testimony and recommendations to the committee SNE itself provided input to the committee, based on the needs identified in CARES' audit report At the time of this evaluation, the bill had not yet passed in the legislature, but it appears to have strong support, and is expected to become law in late 1994

In 1992, CARES held a strategic planning seminar for SNE staff to discuss the audit and to develop a specific plan for carrying out the changes it recommended A list of priorities was developed, and SNE began to implement them to the extent possible, given its available funds CARES funded an institutional development specialist to assist SNE with the transition

4 8 IMPACTS OF SNE ASSISTANCE

With the opening created by the private power generation law, SNE was thrust into an important role from the perspective of CARES and other organizations interested in offsetting Costa Rica's predicted electrical capacity shortage Significant growth of the private power subsector in general -and the financial feasibility of the San Lorenzo project in particular- depended heavily on SNE's ability to check ICE's monopsony power and oblige the utility to offer prices and terms which would make it attractive for private producers to enter the market That SNE was in a weak position to fulfill this role was obvious to many in Costa Rica The agency was underfunded, overburdened with responsibility, and lacked a clear definition of its regulatory role and authority

CARES' institutional audit identified not only the internal weaknesses in SNE's operations, but also the structural weaknesses the concept of public service regulation as it had evolved in Costa Rica The new law, which contained significant input from CARES, is an attempt to transform the regulatory climate of the nation, and bring it closer in line with the manner in which public services are regulated in the United States Ultimately this may be the most significant change brought about by the CARES program

At present SNE itself is in transition, but interviews with key personnel show strong support for the changes CARES has recommended With the funding provisions included in the new law, SNE should be able to transform itself, following the blueprint laid out by CARES Leonel Fonseca, the Director of SNE, is committed to transforming the organization into a modern regulatory agency Significantly, Fonseca is also very much in favor of developing a private power sector in Costa Rica In that area, SNE's technical capacity has been greatly increased CARES provided SNE with the software and technical training required to perform marginal cost analyses, and as a result ICE's tariff proposals for private power have increased steadily Although restrictions in the law may still be holding private investment to a low level, the changes brought about by CARES have increased the likelihood that Costa Rica's predicted generating capacity can be made up by the private sector

4 9 CONCLUSIONS/LESSONS LEARNED

The conditions encountered by CARES in Costa Rica were in many ways unique in the region Coverage of electrical service was much broader, and a movement for support and provision of rural electrification - albeit one that had been somewhat neglected - was already in place in the form of the four cooperatives and their 60,000 members Adequate supplies of relatively low-cost hydroelectric power (supplemented by thermal generation during the dry season), combined with a generally higher level of development in the rural areas of the country meant that one of the standard problems of rural electrification - i e the subsidy required to provide a high cost service to low-income populations - was not as acute in Costa Rica, and horizontal activities such as promotion of productive uses of electricity could be de-emphasized in favor of vertical, sector-wide interventions

The primary problems for rural electrification in the country seemed to be on the horizon The increasing demand for electricity, and ICE's projected shortfall of generating capacity were looking to create a situation not unlike that of the other countries of Central America, where first priority is given to urban and industrial loads with higher demand, broader political support, and higher revenues for the utility This situation, combined with the weaknesses in the cooperatives, meant that without intervention, the rural population of Costa Rica might in the future come to enjoy less access to electricity

Given these conditions, the strategy chosen by CARES in Costa Rica was to reinvigorate the rural electric movement and ensure its sustainability through the formation of CONELECTRICAS, a consortium of the four existing cooperatives The consortium had two purposes On the one hand, it would allow the cooperatives to take advantage of economies of scale in procurement of common services, and give all members access to standard, modern operating practices But from the beginning, its primary purpose was to take advantage of Law 7200 to develop private generating and

transmission facilities, in order to offset the predicted energy shortfall in the country, and eventually it is assumed, to make the cooperatives independent of the national utility Revenues from the sale of electricity to ICE were to be used to support the other services which the consortium would provide to its members

The consortium has gone some distance in fulfilling the latter purpose, in that a significant amount of development work has been performed for the San Lorenzo hydroelectric project, even if the project has not yet attracted the outside investment it requires The work performed by CARES in winning approval for the project, in strengthening the capacity of SNE as an effective regulator and in achieving higher tariffs from ICE, paved the way for other private energy producers, and will likely go a long way toward providing Costa Rica with adequate supplies of electricity in the future, subject to the restrictions inherent in the private power law

But aside from that, CONELECTRICAS seems to have made only small impacts on the operations of the cooperatives to date While certainly beneficial, activities such as the compact fluorescent light bulb program, the transformer rehabilitation facility, and the introduction of computerized mapping techniques seem relatively minor compared to what such an organization might achieve At the date of this evaluation, it was still possible that San Lorenzo would attract investors But if the project is not built, it remains to be seen whether the cooperatives have enough common interests to hold CONELECTRICAS together, and whether CARES main goal for the consortium - to strengthen the rural electric movement in Costa Rica - will be achieved

The question must be asked whether the two roles envisioned for CONELECTRICAS - that of a generation and transmission supercooperative which would supply its member cooperatives with electrical power, and that of an NRECA-like organization which would provide technical, managerial, financial, and political support- are in fact compatible with one another Certainly this arrangement is contrary to the manner in which the rural electric sector has evolved in the United

States, where G&T cooperatives focus primarily on the business they know best - generation and transmission of electricity - and NRECA provides the support services

It may be that in a country the size of Costa Rica, the creation of two distinct organizations is not feasible Without the income from the generating facilities, it is unlikely that a member-supported organization of the scope of NRECA could be sustained solely on the contributions of the four cooperatives Nevertheless, even before it has begun to generate electricity, CONELECTRICAS is already seen to be devoting the majority of its resources to the generation and transmission side of the business, in attempting to attract support for San Lorenzo While it may be argued that the consortium needs the income from the generating facility before it can begin to provide support services to its members, it is interesting to note that the business prospectus developed for prospective investors in the San Lorenzo project stresses CONELECTRICAS' role as a provider of electricity, and makes no mention of any support activities Since the prospectus was developed for the specific purpose of attracting investment in the hydroelectric project, it is no wonder that it tends to emphasize the G&T aspect of CONELECTRICAS' mission But there is no reason to believe that the technical and managerial support activities for its members would decrease the likelihood of attracting investment, and so the omission of any discussion of these activities from the prospe tus seems to indicate their relative lack of importance both to CONELECTRICAS and its member cooperatives Interviews with cooperative managers seem to confirm this impression

Although it would have to be considered a failure for the CARES project if the San Lorenzo project were not built, given the resources that have been expended, the blame for its failure to attract funding so far does not seem to lie with the efforts of Paul Clark or the CARES project It is clear that Law 7200 did not create the ideal environment for private investment in Costa Rica, an AID publication (1) states that "present Costa Rican regulations for the privatization of the power sector are discouraging investments by foreign companies In order to attract more investments, the government of Costa Rica will have to reduce some of its restrictions "

The primary reasons given by Dominion Energy for dropping out of the San Lorenzo project was that the tariff to be paid by ICE was still too low to permit an adequate financial return, and that the price adjustment mechanism created too much risk and uncertainty Other factors may have entered into Dominion's decision, but the fact that CARES is continuing its efforts to achieve higher tariffs, and to clarify the price adjustment mechanism, indicate that these are indeed legitimate issues

But the fact remains that other private energy projects - including some of those rejected in the initial study of 20 potential sites - are being built in Costa Rica Why have these projects gone through when San Lorenzo has not? Part of the reason may lie in the fact that the other projects required less outside capital As a relatively new organization, CONELECTRICAS did not have significant cash reserves, and construction of San Lorenzo was always dependent on the maximum 35% foreign ownership allowed by law At present, CONELECTRICAS continues to build up its financial reserves, and it may be possible that in the future the project can be built without significant foreign investment

It is important to note that the private generation law creates restrictions for the cooperatives as well Law 7200 is said to be modeled on the U S PURPA regulations, but there are significant differences The fact that G&T cooperatives in the U S can sell power to their own members gives the individual cooperatives a great deal of power in negotiations with utilities This has historically assured a steady supply of power for rural electrification In Costa Rica, however, private producers must sell all of their power to ICE, and there are no real assurances that the utility will sell it back to them Changes in the private power law, which would allow power wheeling, are said to be under discussion in the Costa Rican legislature Such changes are necessary if the cooperatives are ever to achieve energy independence

CARES' other main activity in Costa Rica, the strengthening of SNE, appears to have been a

complete success SNE has increased its technical capacity, and is implementing the management changes suggested by CARES An indication of the success of this effort are the funds being invested in SNE by the USAID bilateral Costa Rican mission, and the Interamerican Development Bank The new law which transforms SNE into the Autoridad Reguladora de los Servicios Publicos has clarified SNE's role, but the organization still seems overburdened with responsibility

The primary objective of the CARES program was to increase the access of the rural population of Central America to the benefits of electricity It is of course too early to determine directly whether that objective has been met However, given the information gathered for this evaluation it is clear that CARES has played a critical role in strengthening and transforming the institutions which impact rural electrification in Costa Rica But it should be noted that every important activity carried out by CARES in Costa Rica came about as the result of the passage of Law 7200 There are still defects in this law, and the sustainability of CARES efforts will ultimately depend on how this law is interpreted

5 MUNICIPAL ASSISTANCE PROGRAM

5 1 SUMMARY OF MAJOR IMPACTS

CARES' assistance to the municipal utilities of Guatemala achieved their greatest impact in the Empresa Electrica de San Marcos These impacts included the following

- A 14% increase in the number of electrical connections in the municipality over four years

- Addition of 675 new rural connections through the utility's internally managed rural electrification program

- Increases in managerial and technical efficiency, one measure of which is the near doubling of the number of service connections per employee, from 70 to 133 during he period of CARES' assistance

5 2 BACKGROUND

As bilateral and multilateral aid organizations have shifted their strategies away from large, centrally planned projects toward locally-based efforts involving decentralized institutions, the strengthening of local governments and local institutions has become an important aspect of development programs With the electrical subsector of Central America dominated by large, state-owned utilities which generate, transmit, and distribute the majority of electrical power, CARES' program of assistance to municipal utilities presented an important application of this new focus

While decentralization of utilities and other government services is a complex and often sensitive political issues in all the countries of Central America, two of them – Guatemala and Costa Rica – have had long experience with municipal electric companies, which operate as agencies of local government, purchasing electricity in bulk from the national utility and reselling it to residential, commercial and industrial customers within the jurisdiction of the municipality In some cases there is some local generating capacity as well But the history of municipal utilities in Guatemala has followed a pattern of general neglect, decline in quality of service, loss of service territory, and eventual takeover by the central utility It is a matter of some debate whether deterioration of service is the cause or the result of pressures to centralize operations, but the fact remains that in Guatemala there remain only eleven municipal utilities, down from 35 in the mid-1950's

The takeover of an inefficient, poorly managed local system by the central utility may indeed result in short-term improvements in service, but there are a number of advantages to well-managed municipal utilities As divisions of the local government, municipal utilities can be more familiar with their customers, and more responsive to their needs than a large utility headquartered in a distant capital city In a democratic society, citizens can use the political process to influence the performance of the local utility, making quality of service an issue in local elections Munic pal control can also streamline utility operations, since many activities such as purchase of spare parts, meter reading, mapping, and routine maintenance can be handled more efficiently at the local level A municipal utility can also be the source of intangible benefits, such as civic pride

But the benefits of municipal control must be balanced by consideration of its potential drawbacks Many activities, such as training and long-range supply planning, can be handled more efficiently by a large central utility The susceptibility of municipal utilities to local pressure can have negative consequences as well, if political concerns are allowed to take precedence over financial and technical issues in setting institutional policy There is also the danger that powerful local interests may use their influence to the detriment of other groups such as the rural poor In the

absence of strong democratic institutions, a municipal utility can also be affected by political corruption It may be used as an instrument of patronage, with municipal officials awarding jobs and contracts in return for political support And since the utility provides a steady source of income for the municipality, officials may be tempted to divert these funds to other civic purposes to make up for budget shortfalls Thus while municipal utilities present an attractive model for decentralization, they include a number of tradeoffs which must be considered carefully in light of local economic, social, and political conditions

It is interesting to note that municipal utilities in the United States followed a similar pattern of historical decline During the first decade of the 20th century, at the inception of the electric utility industry, public power systems were installed at twice the rate of privately owned systems (2) Although most of these public utilities served smaller towns and cities, voters in almost every major city in the country were at some point asked to choose between public and private power The issues are somewhat different in Guatemala, where municipal utilities have been taken over by the central government-owned utility, but the reasons advanced for the takeovers – the inefficiency of local management, the economies of scale available to larger entities, etc – were often the same

In 1991, at the request of USAID/ROCAP, CARES began a program of managerial and technical assistance to the municipal utilities of Guatemala, with a view toward establishing a potential model for decentralizing all of Guatemala's electrical distribution The assistance began with a survey of the eleven existing municipal utilities (Gualan, Guastatoya, Huehuetenango, Jalapa, Puerto Barrios, Quetzaltenango, Retalhuleu, San Marcos, San Pedro Pinula, San Pedro Sacatepequez, and Zacapa) to assess their operations and develop a plan for required improvements Such assistance fit with CARES' goal of establishing an effective, diversified set of institutions to promote and support rural electrification The specific outcome of these activities was to be an increase in the ability of municipal utilities to provide and sustain rural electrification

5 3 INITIAL OPERATIONAL SURVEY

The operational survey was carried out through interviews with utility personnel and local political leaders, and on-site inspection of equipment and facilities A number of major problems were identified which were present to varying degrees in all eleven utilities These included poor maintenance, a lack of trained personnel, and a lack of long-range planning capability for system expansion and equipment upgrade Although these problems resulted in rather poor service to consumers, the utilities were nevertheless highly valued by their communities Ultimately most of the shortcomings seemed to stem from the fact that the utilities were being managed by municipal councils, which considered day-to-day operating decisions along with other municipal business in regular council meetings While sincere efforts were made to run the utilities in an efficient manner, council members lacked the technical and managerial knowledge required to operate a modern utility

5 4 EMPRESA ELECTRICA DE SAN MARCOS (EEMSM)

From the time of the initial survey, political leaders in the municipality of San Marcos – in particular the mayor, Daniel Caballeros – were very receptive to the assistance CARES was proposing (Caballeros had been elected mayor in 1990 on a platform which included upgrading the municipal utility) Because of this support, CARES ultimately came to focus the majority of its efforts on the municipal utility of San Marcos, and achieved most of its success there

The Empresa Electrica Municipal (Municipal Electric Company) of San Marcos was legally established in 1955 Although the relative geographical isolation of the municipality had resulted in a greater degree of independence from the national utility INDE, by the inception of CARES

assistance program the EEMSM was suffering from the same difficulties being experienced by other Guatemalan utilities Operations were supervised by a five-member board of directors drawn from the municipal council, with the mayor acting as General Manager While these officials appeared to be making a sincere effort to conduct the affairs if the utility in a fair and efficient manner, their lack of knowledge of utility operations resulted in poor service to consumers There were frequent power outages, irregular voltages, and long waiting times for new connections A lack of emphasis on maintenance had resulted in physical deterioration of the distribution system, with technical and non-technical losses running near 50% There were no plans for long-term growth, and service expansion was effectively stagnant

In 1991, the EEMSM was serving approximately 2500 customers, of which approximately 90% were within the city of San Marcos, and the remainder in the surrounding rural areas INDE was the main supplier of electricity, but the La Castalia hydroelectric plant on the nearby Palatza river satisfied about 20% of the total demand – mainly for water pumping – on a separate grid isolated from the main system Due to poor maintenance and silting resulting from deforestation in the surrounding watershed, La Castalia was producing only about 70% of its design capacity of 275 kW

5 5 ASSISTANCE PROGRAM TO THE EEMSM

CARES program of assistance in San Marcos focused on four major areas technical assistance, managerial and legal support, information systems support, and watershed management for the La Castalia hydroelectric plant The following sections summarize the results of these interventions

5 5 1 TECHNICAL ASSISTANCE

CARES focused a great deal of effort on providing training for utility maintenance personnel, and seems to have achieved large improvements in the technical operations of the utility Of particular success was the lineman training, which introduced technicians to techniques of working on energized lines (previously the entire line was de-energized for maintenance, resulting in service outages to customers) Based on interviews with service personnel, these courses seem to have been very effective, and have resulted in improved system maintenance and reduced construction time The system map produced with CARES assistance has also improved overall system quality, since it allows staff to locate problems quickly and plan maintenance activities more effectively

Another activity which seems to have been particularly successful was the surplus equipment program Since 1991, NRECA's International Foundation has donated some 40 containers of surplus materials to the EEMSM, with shipping costs paid through CARES funds While the surplus equipment did achieve the goal of reducing materials costs for line construction, it also came to be used in ways unforeseen by the CARES staff The utility was able to use the surplus materials to leverage funds from the municipality for line extensions to rural areas of the municipality The uti y also began using the equipment to generate income, selling what was not needed to other utilities in the region

5 5 2 ADMINISTRATIVE AND LEGAL SUPPORT

With CARES assistance, the EEMSM drafted a new policy document (the *Reglamento de Prestacion de Servicios*, or rules for provision of services), replacing previous ad hoc policies which had resulted in poor consumer relations New bylaws were drafted for the utility, with an effort to facilitate administrative and legal autonomy The most significant change seems to be the creation

of an administrative board consisting of representatives from the municipal government, consumers, and utility personnel Control of day-to-day operations and long-range planning will pass from the municipal council to this board

There are several indications that the utility has improved its performance since 1991 as a result of these changes An indication of the growth of the utility is shown by the nearly 14% increase in the number of urban connections since that time, from 2800 to 3186 Some 675 new rural connections have been added as well

A major indication of the utility's improved efficiency is the near doubling of the number of service connections per employee, from 70 in 1991 to 133 in 1994 This was achieved primarily through a 40% reduction in staff

One fundamental measure of a utility's sustainability is its capability to determine tariffs which allow it to recover capital and operating costs and to finance future system expansion Because tariff calculations depend on accurate collection of data on all aspects of utility operation, they require at the minimum a detailed system of record keeping and a highly trained accounting staff More involved calculations which attempt to account for changes in the exchange rate, inflation, escalation of fuel and other operating costs, and the rate of growth in demand among various rate classes, generally require the services of energy economists

Although the EEMSM's rate-setting procedure was not examined in detail, interviews with staff and a general examination of available data indicate that the utility does not yet have the capability to perform tariff calculations beyond the level of annual cost allocation This is not unusual for a utility of the size of the EEMSM, but future growth will require access to improved methods of rate calculations, as well as improvements in record keeping

5 5 3 INFORMATION SYSTEMS SUPPORT

CARES' main activities in information systems support were the development of an automated billing procedure and a warehouse inventory management system These efforts appear to have been unsuccessful to date The EEMSM continues to use manual procedures for customer billing and for management of warehouse inventory According to utility personnel, the software which was developed (an adaptation of a system used by a cooperative in Costa Rica) was unsuited to their needs, and was cumbersome to operate Actually the present method of billing is very efficient, and while a computerized system might improve record-keeping, it would probably not reduce billing lag Presently meter readers travel to each connection, compare the meter reading with the previous month's total, and calculate the bill on the spot and present it to the consumer

This makes the billing process susceptible to errors, but it does offer some advantages over a centralized system, given the realities of San Marcos An automated billing procedure would in fact increase the billing delay, since it would require meter readers to collect readings and take them to the utility for processing Since mail service is unreliable, another trip would have to be made to the service connection to present the bill

5 5 4 WATERSHED MANAGEMENT

One reason for the deteriorated performance of the La Castalia hydroelectric plant was water turbidity due to deforestation in the surrounding watershed In a collaborative effort with DIGEBOS, FUNDAP, and other organizations, CARES developed a management plan for the Palatza watershed

which included the development of seedling nurseries, incentives for tree planting, training in soil conservation for local farmers, and provision of credit for purchase of improved woodstoves

While it is too early to determine the impact this plan has had on deforestation in the watershed, some general observations can be made One innovative feature of the plan was its emphasis on individual rather than collective incentives Instead of organizing crews to reforest common areas, the program encouraged individuals to plant seedlings on their own private land The plan also received support from the municipal government, which provided funds to hire reforestation promoters

It is questionable however whether credit for improved woodstoves will have any impact on deforestation While these stoves may reduce rural inhabitants' demand for firewood, numerous studies of fuelwood use in Guatemala and elsewhere have shown that rural residents use only a small portion of the wood they cut for their individual cooking and heating needs The majority of the wood is sold in urban areas, to businesses such as bakeries The management plan focuses strictly on fuelwood demand within the watershed itself, and will have no effect on urban demand

5 6 CONCLUSIONS/LESSONS LEARNED

In 1991, the municipal utilities of Guatemala were in a period of long decline characterized by shrinking numbers and deteriorating service in those that remained CARES' program of municipal assistance showed that municipal utilities can provide a viable alternative to central utilities under the right conditions After receiving the required technical and managerial training, the EEMSM showed measurable improvements in the quality of service it was able to provide consumers, in the physical condition of the network and associated equipment, and in the financial health of the business itself The utility even began its own program of rural electrification, rivaling INDE's PER

III program, at least in relative terms At the time of the interviews with EEMSM personnel, CARES' assistance had effectively terminated, but the more modest results in the municipalities of San Pedro, Retalhuleu, and Guastatoya, where CARES also intervened, show that while technical and managerial training are necessary conditions for improving utility operations, they are not always sufficient

The key role of local political leaders in the success of the assistance program in San Marcos brings up the issue of sustainability The current mayor of San Marcos was a strong supporter of the CARES efforts to improve utility operations, but his term expires in 1996 Nevertheless it appears that the new operating bylaws, the change in philosophy at the utility, and the increased emphasis on efficient management will outlast changes in political leadership The majority of CARES interventions in the EEMSM seem to have been institutionalized, indicating that they will outlast the project

However, the ultimate goal of the municipal assistance program was to provide a model for other utilities in Guatemala, and in the region as a whole While positive changes were made in the technical operations of certain other Guatemalan municipal utilities, the bulk of the effort seems to have focused on San Marcos, due to the receptivity of the political leadership and utility personnel Improving the operations of municipal utilities throughout the country – and creating local utilities in other municipalities – would seem to require at the outset a national association of municipal utility managers Given Daniel Caballeros' support for the EEMSM, his election as president of the national association of mayors will likely bring about an increased awareness of the important role of municipal utilities among mayors of other municipalities in Guatemala NRECA international is also negotiating a plan of technical assistance to a program funded by the Central American Development Bank which seeks to create new municipal utilities in Guatemala

On a regional basis, only one other country, Costa Rica, currently has municipal electrical utilities

CARES involvement with the Costa Rican municipals seems to have been limited to initial discussions during the formation of CONELECTRICAS Since by all accounts these utilities are very well-run, their methods of operation – and the way in which they survived pressures to centralize from their own national utility – may have provided some important lessons for the Guatemalan municipals

6 DEMAND ASSESSMENT MODEL (DAM)

6 1 SUMMARY OF MAJOR IMPACTS

The DAM model provided utilities with a tool by which potential rural electrification projects could be ranked according to rational financial criteria The impact of CARES assistance include

- Institutionalization of DAM within INDE as a result of the PER III program

- Institutionalization of DAM within CEL as a result of the bilateral El Salvador rural electrification program

6 2 BACKGROUND

Rural electrification programs have been criticized in the past for providing the majority of economic benefits to the relatively affluent sectors of rural society, while poorer residents achieve only comfort-level improvements in living standards, such as access to electric lighting, radio, television, and other household appliances The low electrical demand from the majority of rural households, and the resulting low revenues to the utility, makes rural electrification a poor investment from the standpoint of the utility

Section 2 discussed one way the CARES program sought to increase the demand for electricity in rural areas, through promotion of productive uses and provision of credit But on a more basic level, utilities require a tool which allows them to screen and prioritize candidate electrification projects In the past, rural electrification has been directed more on the basis of political concerns than on concern for financial return to the utility This was the purpose of the DAM computer

program

For the initial screening process, DAM requires as input such information as demographics, line extension costs, and number of connections Screening at the community level requires much additional information, which must be collected by trained personnel tariff schedules, electricity conversion rates, generation costs, distribution site characteristic and costs, residential energy uses, and the identification and estimation of electricity demand for productive uses The model outputs a great deal of data, but the most important to the utility is the benefit/cost ratio, which ultimately allows the ranking of projects

6 3 DAM AND PER III

CARES began promoting the use of DAM within INDE almost from the beginning of the project, providing training in its use, and in the collection of the field data required for input Interviews with officials of INDE indicated that DAM became an important component of PER III, and contributed highly to its success DAM has been institutionalized within INDE, and interviews with INDE personnel indicate a high degree of acceptance, making it certain that future rural electrification programs will utilize it

6 4 DAM IN OTHER CONTEXTS

CARES also introduced the use of DAM in the El Salvador rural electrification project, where it was used extensively and with success by the national utility CEL The use of DAM appears to have been institutionalized within CEL, though its continued use will of course depend on the existence of funds for rural electrification in that country DAM was also introduced to ENEE in Honduras as part of the Aguan Valley rural electrification study, but given the present low priority for rura electrification in Honduras, it seems doubtful that the program will see much use there DAM was used to a small degree in Nicaragua in the Atlantic Coast Electrification project, but does not appear to have been institutionalized within INE

6 5 CONCLUSIONS/LESSONS LEARNED

The Demand Assessment Model came to be widely used by the national utilities of Guatemala and El Salvador Both have used it successfully in infrastructure-based rural electrification programs to provide a ranking among various communities requiring service, in order to select those

communities which will provide the greatest return on investment It is difficult to separate the influence of DAM from the productive uses component, but the two combined do result in higher consumption of electricity in rural communities, as observed in Section 2

DAM has turned out to have additional benefits to both the utility and to rural communities In a sense, the focus on the benefit/cost ratio introduces the utility to the concept of marketing its services, as opposed to the central government directing rural electrification based on other criteria Because DAM's selection criteria is transparent, its use has tended to reduce the importance of political influence in rural electrification, or at least has shifted these concerns from the community to the macro level (e g , politics undoubtedly played a role in the decision to focus PER-III on the highlands of Guatemala) Community leaders are aware of what is required to receive electrical service, and community members work to fit these criteria, because they are certain of receiving service

But the use of DAM raises some questions of equity and distribution Although the focus of the PER-III program was the poorest region of Guatemala – the central highlands – DAM's selection criteria seemed to assure that the wealthiest communities in the region received service first The use of the benefit/cost ratio also implies that those communities with the lowest electrification costs will receive priority, i e communities in easily accessible geographical areas, close to roads and existing transmission lines

CARES' efforts to promote the use of DAM in the region point out one of the main difficulties encountered in a support project of this type The degree to which DAM was employed and institutionalized in the central utilities depended ultimately on the existence of ongoing large-scale rural electrification projects Only by carrying out these projects could utilities become aware of the advantages of rational selection of areas and communities to receive service For this reason, DAM was used extensively only in Guatemala and El Salvador Although the program did see some

limited use in Honduras, DAM was not institutionalized within ENEE because of the lack of interest on the part of the utility in rural electrification

7 DECENTRALIZATION SUPPORT

7 1 SUMMARY OF MAJOR IMPACTS

The program of assistance for the creation of the Roatan Electric Company had a number of positive impacts both on the island itself, and on the wider policy environment for rural electrification in Honduras These impacts include

- Introduction of reliable electrical service in Roatan, with adequate generating capacity and 24 hour per day service

- Provision of electrical service to more than 1,000 new rural and urban customers

- Significant changes in Honduran law, which will facilitate the creation of other private electrical utilities

7 2 BACKGROUND

By the beginning of the CARES program in 1987, the long period of decline experienced by the Central American electrical utilities was reaching a point of crisis Heavy foreign debt, combined with rapid inflation and falling exchange rates, made it increasingly difficult for utilities to meet the growing demand for energy Not only were funds becoming scarce for the expansion of generation and transmission capacity, but for maintenance of existing infrastructure as well

While energy economists saw decentralization and privatization as the most likely solution to the crisis, political realities in the region made such options very difficult to carry out Central America

had originally had a number of private utilities, but the high tariffs charged, and the lack of concern for national development shown by these largely foreign-owned entities had led to their nationalization by the central governments This lesson was still fresh in the minds of many, who saw electricity as a national resource which should rightly be controlled by the national government

Control by the central government had indeed brought lower tariffs, but only at the cost of increasingly larger subsidies To impoverished residential consumers, privatization became associated with higher prices To the labor unions which had organized the utilities' staffs, privatization suggested a loss of jobs and political power Thus by the late 1980's it was not uncommon to see anti-privatization graffiti in the capitals of Central America, and the subject provided a frequent spark for street protests

If consumers and labor unions were largely against privatization, utility executives seemed more receptive, at least toward decentralization of some of the utility's activities Recognizing that their strength (and the most profitable sector of their business) lie in generation and transmission, many utility executives in the region supported, at least in private, concepts such as rural cooperatives, municipal utilities, and even privately-owned utilities, for locations which the central utility was unable to provide service

Because of the conflicting interests involved in privatization and decentralization, the CARES project proceeded with some caution in its efforts to promote these alternatives For the most part the project avoided the larger policy debates over the privatization of electrical utilities, concentrating its efforts instead on isolated locations where the central utility had provided relatively poor service, and residents were willing to try other options The most successful of these efforts was carried out in Roatan, Honduras

7 3 ROATAN ELECTRIC COMPANY

In 1990, CARES performed a prefeasibility assessment of potential locations for electrical cooperatives in Honduras Several regions were evaluated according to financial, economic, technical, and political criteria, and one of the most favorable sites identified was Roatan With an area of 30 square miles and a population of approximately 25,000, Roatan is the largest of Honduras' Bay Islands The thriving fishing and tourism industries are responsible for the high per capita electrical demand, which is the highest in all Honduras

ENEE began electrification of the island in 1979 with the construction of distribution systems in French Harbour, Coxen Hole and Oak Ridge Power for the system was purchased from local fishing industries which operated their own diesel generators, but within a few years it became apparent both to ENEE and to the island's residents that dedicated generating capacity was required The private generators were operated primarily for the benefit of the companies which owned them, and residential and commercial consumers received only irregular service

Eventually, with assistance from the Dutch government, ENEE was able to finance the construction of a new generating facility in French Harbour consisting of three 2 2 MW diesel generators manufactured by Stork-Wartsila The transmission and distribution network was also expanded to serve the majority of potential consumers These projects, completed in 1991, provided adequate system capacity, but ENEE continued to experience problems in managing the system One reason for this is that the isolated location of the island seemed to require a degree of autonomy in system operation and maintenance As a centrally-managed, government-owned utility, ENEE was unaccustomed to granting such autonomy Unreliable communication and transportation links between Tegucigalpa and Roatan caused delays in critical management and operating decisions, and consumers continued to suffer frequent power outages and irregular voltages With the election of the Callejas government, the climate became more favorable for limited privatization of state-owned

enterprises, and the Roatan electrical system, which was causing increasing financial losses to ENEE, seemed a prime candidate to be sold to a private entity

7 4 ASSISTANCE PROGRAM TO RECO.

In 1991, at the request of ENEE, CARES performed a feasibility study of transferring control of the Roatan system to a private, locally-owned cooperative or company This study showed that such a company was indeed financially feasible, although for various historical and political reasons, the idea of a cooperative was rejected, and CARES proposed the creation of a broad-based, consumer-owned utility

CARES then organized a series of meetings to explain the concept to the local business community Initial interest was lacking, but ENEE's continued poor management of the system, and political pressure from the Callejas government in Tegucigalpa due to ENEE's financial losses, convinced the islanders to act In early 1992 a company was formed to receive pledges of investment, and an interim board of directors was elected to negotiate the terms of the sale with ENEE By mid-1992 the required investment had been received, and the Roatan Electric Company was organized

The CARES project was heavily involved in all aspects of the eventual formation of RECO, and in the negotiations with ENEE The creation of a private utility also required a series of political agreements in the Honduran Congress, since new legislation was needed to allow the sale of ENEE's assets to a private corporation CARES assisted in this process as well, reviewing the proposed legislation As the delay became unacceptable to both ENEE and RECO, an interim agreement was also negotiated, allowing RECO to take over limited management of the system under ENEE's supervision in the interim

Finally in January 1993, ENEE handed over control of the Roatan electric system to RECO In effect, ENEE provide two loans to RECO for the purchase of the generating facility and other system infrastructure, one payable to ENEE in the amount of US $4 3 million, and another in the amount of US $8 1 million, payable to the Dutch development bank

CARES continued to provide extensive technical and managerial assistance to the utility, advising the company on organization, staffing, and operations This assistance continued until the end of the project in March of 1995, and continues up to the present with separate consulting contracts through NRECA international

7 5 IMPACTS OF ROATAN ASSISTANCE

The fundamental question in the evaluation of CARES assistance to RECO is whether the project created a viable, sustainable utility which can serve the present and future energy needs of the island of Roatan It is clear that with extensive assistance from CARES and CARES-financed consultants, RECO has in a very short time reached the point where it is providing a valuable service to the islanders In its first year of operation, the utility doubled the number of customers previously served by ENEE, and electricity sales have increased by 30% annually Power outages have been reduced, and the stable electrical supply is an important factor in the island's economic growth

Financially, however, RECO is still experiencing problems CARES' originally favorable financial projections were based on the hookup of the large fish processing plants That this has not yet occurred has caused losses to be larger than expected, and will likely delay the eventual profitability of the company RECO recently commissioned a rate study to develop a tariff structure which will attract the major island electrical consumers

Additional financial problems have occurred due to the falling exchange rate of the lempira, since the loan to the Dutch government is payable in guilders The value of the lempira also affects the cost of fuel Nevertheless ENEE's recent audit of RECO gave the company a limited vote of confidence, and the feeling among the board of directors is that while RECO may not yet have turned the corner, it soon will

It is clear that from the standpoint of the island's electrical consumers, RECO has been a success When asked to compare the service provided by RECO with that of ENEE, residents recalled the frequent power outages and voltage fluctuations which occurred in the past, reducing the usefulness and life of appliances such as televisions, VCR's, and refrigerators Indeed except for the continued high price per kilowatt-hour, the operation of RECO now seems almost invisible to most of the island's consumers The utility provides the service it promises, and there are few complaints

Nevertheless, the transition from ENEE to RECO did not occur without some difficulties One early problem was that in order to eliminate the residual three-month billing lag ENEE operated under, RECO sent out three bills in the same month While some effort was made to inform customers in advance that this was to occur, many islanders remained unaware of the reasons for the triple billing Additionally, residents noticed that their monthly bills from RECO were somewhat higher than in previous years Apparently there were two reasons for this First, the chronic voltage fluctuations during ENEE's period of management had caused the meters to give improper readings Secondly, ENEE had placed little emphasis on the accuracy of metering Meters were calibrated infrequently if ever, and meter readers were poorly trained and prone to errors The stable voltages provided by RECO, and its increased emphasis on billing accuracy, did result in consumers being billed for more kilowatt-hours than they had in the past

Because of this and the triple billing, many consumers' initial perception of the utility was rather negative It seems that this impression may have been avoided had RECO, and CARES, placed more

emphasis on consumer relations Indeed, many islanders interviewed in 1995 pointed to a lack of attention to consumer relations as RECO's main shortcoming This problem apparently came to a head late in 1994, when a variety of grievances led to public demonstrations in front on RECO's office in French Harbor Nevertheless, these were seen to be a result of internal problems in RECO's management, and the majority of residents remain satisfied with the utility's operation

The island of Roatan is at present experiencing rapid economic growth Tourism has increased with the construction of a new international airport A variety of new hotels, resorts, and housing developments are being built, primarily on the western half of the island According to developers, the stable electric supply provided by RECO has been a major factor in this economic growth

It is clear that as a growing company in its second year of operation, RECO will continue to require technical and managerial assistance Increasingly, however, RECO seems able to determine the type of assistance it requires, and utility management is making its own decisions on how to proceed for the future

7 6 CONCLUSIONS/LESSONS LEARNED

It is clear from interviews that island residents now place a high value on the Roatan Electric company Early complaints about price and methods of operation have largely disappeared due to the stable, reliable service being provided RECO is an integral part of the rapid economic growth which is taking place on the island

Although CARES seems to have initially underestimated the level of effort which would be required to create the utility and bring it to the point of sustainability, their activities in Roatan were essential to the success which RECO has been able to achieve RECO management speaks highly of CARES staff members, and has an overall high opinion of the services which were provided by

the project Several members of management expressed the opinion that the blame for any shortcomings in the utility lies with they themselves, and their unfamiliarity with utility operations

RECO's management of the technical aspects of the utility appears to be quite good, and the contrast with the level of service provided by ENEE is striking Nevertheless, RECO is still experiencing financial difficulties due to the inability to sign up large industrial consumers, and the falling value of the Honduran lempira. Strategies are being developed to resolve these problems, and a financial audit by ENEE in late 1994 gave the utility a limited vote of confidence

In order to avoid the complex political issues associated with wholesale privatization of utilities, CARES chose to carry out smaller-scale privatization efforts in remote locations, where the low level of service provided by the central utility made residents more receptive to the idea of a private utility But the experience in Roatan, and similar experience in the creation of an electrical cooperative on the island of Meanguera in El Salvador, indicate the difficulties inherent in this approach While the primary goal of decentralized management is to increase local control over resources, remote locations such as Roatan lack a pool of trained managers and technical staff who are qualified to take part in the decision-making process The lack of experienced personnel on Roatan is one reason why the effort which was ultimately required was higher than CARES had anticipated Future projects should take this into account in planning and budgeting

9 0 MAJOR FINDINGS AND CONCLUSIONS

In its eight years of operation, the CARES project carried out a wide range of interventions which, based on interviews with key individuals, were highly valued in the region The most important of these interventions were

- Dissemination of productive uses promotion techniques in development organizations and central utilities throughout the region

- Development of the DAM model, its widespread dissemination in the region, and its institutionalization in the central utilities of Guatemala and El Salvador

- Creation of a new decentralized utility in Roatan, Honduras

- Strengthening of the managerial and technical efficiency of the Guatemalan municipal utilities

- Significant changes in the policy environment in Costa Rica and Honduras, which allowed the introduction of the private sector into electricity generation in these countries

While external conditions seemed to overwhelm the project's ability to have major impacts on the level of rural electrification in Central America, CARES was successful in creating conditions in a number of locations which can be used as models for future programs by central governments and bilateral and multilateral development organizations The project highlighted a number of lessons learned for such future projects, including the following

- **Support projects can only be effective where there are ongoing efforts to support** One reason for CARES' unequal coverage of the region is that not all national governments and central

utilities in the region put the same emphasis on rural electrification

• **Varying social, political and economic conditions in individual countries limit the potential for regional impacts.** CARES' successes in individual countries and communities were difficult to extend across the region due to the unique conditions encountered in each location

•**Project goals should be set realistically, taking into account the environment in which the project is operating, and the experience of similar projects in the past** Many of CARES' goals seemed unrealistically high, and were unmet For example, given the population growth in the region at the beginning of the project, and the large investment in infrastructure required for rural electrification, it should have been obvious that the project would ultimately have little effect on the percent of rural residents with access to electricity

•**The process of rural electrification in the developing world bears little resemblance to the history of rural electrification in the United States.** In a number of cases, CARES underestimated the level of effort required for institution building and institutional strengthening This seemed to be due in part to a tendency to rely on experience gained in carrying out similar activities in the U S , under conditions which were radically different from those encountered in Central America

APPENDIX A PROJECT LOGICAL FRAMEWORK

Goals	Specific Outcomes	Impact Indicators	Information Sources and Measurement Approaches
1 0 INCREASE ECONOMIC AND SOCIAL DEVELOPMENT IN RURAL AREAS OF CENTRAL AMERICA THROUGH ELECTRIFICATION	1 1 Establish conditions for economic and social development through a 7% increase in rural electrification	• difference in number of rural electric connections before/after CARES • difference in number of rural people with electricity before/after CARES • difference in number of productive uses with electricity before/after CARES	•Utility records •Field surveys •Records of NGO s (e g FUNDAP GENESIS)
	1 2 Increase the welfare of rural households	• "first round" economic benefits of electrification per residential and productive connection • economic benefit from eliminating outages in rural community	•Case studies of selected areas/project components •Utility survey
	1 3 Increase income and employment in productive uses in rural areas	• number of jobs created through productive uses in one or more selected projects • salary differences in enterprises with/without electricity in one or more selected projects	•Field survey •Field survey
	1 4 Increase employment of women in rural areas	• number of jobs created for women through productive uses in one or more selected projects	•Field survey

Goals	Specific Outcomes	Impact Indicators	Information Sources and Measurement Approaches
2 0 ESTABLISH AN EFFECTIVE DIVERSIFIED SET OF INSTITUTIONS TO PROMOTE AND SUPPORT RURAL ELECTRIFICATION	2 1 Increase the number and impact of viable non utility institutions contributing to RE and PU	• difference in number of institutions before/after CARES and changes in viability of existing institutions	•Project documentation
		• number of these institutions directly involved with the CARES project	•Project documentation
	2 2 Increase the number and impact of autonomous municipal utilities providing RE	•number of municipal utilities interacting with CARES project	•Case studies
		•increase in number of customers served before/after	•Project documentation
		•increase in institutional viability of municipal utilities	
		•improvements in service to municipal customers	•Project documentation
	2 3 Increase other private sector roles in RE and PU systems	•amount of private investment leveraged by CARES	•Utility records/field surveys
		•increase in non traditional activities taken over by private sector	
		•increased interaction between utilities and private sector	•Project documentation
		• difference in generation capacity in isolated systems	•Case studies
	2 4 Increase the likelihood that generation needs for RE can be met		•Case studies/interviews
			•Project documentation/utility records

Goals	Specific Outcomes	Impact Indicators	Information Sources and Measurement Approaches
3 0 INCREASE THE ECONOMIC AND FINANCIAL VIABILITY OF RURAL ELECTRIFICATION BY REDUCING ITS COST AND INCREASING ITS BENEFITS	3 1 Reduce line construction cost of RE by 20% in those institutions where new standards are used	• change in line construction costs per kilometer	•Utility records
	3 2 Significantly increase productive use consumers as a proportion of total consption in target areas	• percent change in the productive use consumers ratio This ratio is a comparison of the number of new consumers who use electricity for purposes with identified economic benefits to the total number of new consumers	•Utility records/NGO records/field surveys
	3 3 Implement improved planning and decision processes in selected utilities in at least two countries	• number of DAM (and other) applications • number of packages of DAM that have been produced • number of institutions that have used DAM	•Project documentation •Utility records •Project documentation
	3 4 Increase beneficiary contributions to rural electrification	• change in percent of total RE costs contributed by beneficiaries	•Project documentation

Goals	Specific Outcomes	Impact Indicators	Information Sources and Measurement Approaches
4 0 TRANSFORM THE POLICY ENVIRONMENT IN WHICH RURAL ELECTRIFICATION OPERATES	4 1 Increase receptivity of policymakers to decentralized contributions to RE	• number of major utilities accepting decentralization •other changes in policy environment (e g laws on privatization)	•Project documentation/case studies •Project documentation
	4 2 Implement integrated approach to RE in a variety of institutional settings	• number of RE projects in which integrated approaches have been used	•Project documentation
	4 3 Accelerate tariff reform	• number of instances of tariff reform that were accelerated by CARES activities	•Project documentation
		• number of regulatory assessments public relations programs marginal cost studies and other activities that lay the foundation for tariff reform	•Project documentation/case studies
	4 4 Develop and demonstrate innovative approaches to financing RE and PU	• number of innovative financing approaches achieved through CARES assistance	•Project documentation/case studies

Goals	Specific Outcomes	Impact Indicators	Information Sources and Measurement Approaches
5 0 SUPPORT AND LEVERAGE OTHER PROJECTS ACTIVITIES AND INSTITUTIONS CONCERNED WITH RURAL ELECTRIFICATION IN CENTRAL AMERICA	5 1 Support bilateral and multilateral RE projects	• $ amount of investment brought into the region • $ amount of local financial support contributed to RE	• Field studies • Project documentation/field study
	5 2 Provide on-call response to regional RE needs	• instances of technical assistance provided above and beyond planned project activities	• Project documentation
	5 3 Leverage project funds to increase investment in RE	• amount of extramural funds (commercial bilateral/multilateral project funds and nontraditional funds) invested in RE fostered by the CARES project	• Project documentation

Goals	Specific Outcomes	Impact Indicators	Information Sources and Measurement Approaches
0 BUILD AN EFFECTIVE SELF SUSTAINING INFRASTRUCTURE TO CONTINUE THE PROJECT S MOMENTUM AFTER IT ENDS	6 1 Install units/functions/responsibilities in institutional structures specifically related to promotion of RE	• enumerate institutions, departments (describe functions, major results)	•Project documentation/ interviews
	6 2 Assure mechanisms for regional transfers of RE experience over the long term	• contribution of CARES to the CLER conference	•Project documentation
		• coverage of material on CARES in NRECA publications	•Proejct documentation
		• create a regional association of independent power producers	•Project documentation/case study
		• create a library or repository of CARES publications	•Project documentation
	6 3 Develop pool of human resources to sustain RE in Central America for the long run	• increase the number of local citizens involved in CARES project work (end of project compared with early stage)	•Project dosumentation
		•increased productivity in utilities at managerial and technical levels due to training	•Project documentation/ interviews
		•increase in effectiveness of NGO development organizations as a result of training	•Project documentation/ interviews

APPENDIX B DOCUMENTS REVIEWED

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